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CONTENTS

	PAGE
Editorials	391
Letters to the Editor	396
Publications Received	397
The Scrap Heap	398
Overseas Railway Affairs	399
Improvements to P.L.M. Express Engines	401
Netherlands Railways Permanent Way	403
New Saddle Tank Locomotives, N.W.R. (India)	404
N.S.W. Railways and the 150th Anniversary	404
All-Steel Wagons for South African Railways	406
Mechanical Accounting, New Zealand Railways	407
American Grill Cars	410
German Refrigerator Wagons	411
Railway News Section	413

DIESEL RAILWAY TRACTION

A Supplement illustrating and describing developments in Diesel Railway Traction is presented with every copy of this week's issue

Railway Assessments

THE recently-published annual report of the Railway Assessment Authority for the year ended March 31, 1938, shows that the various parts of the first railway valuation roll (operative for the period April, 1931, to April, 1936) were finally "revised" during the year. "Cumulo" values, *i.e.*, the total net annual values in this roll for the four main line railways and the former Metropolitan amounted to £5,812,131, made up of L.M.S.R. £1,750,000, L.N.E.R. £1,100,000, G.W.R. £1,650,000, Southern £1,077,131, and Metropolitan £235,000. These amounts compare with pre-existing assessments of approximately £3,629,602 L.M.S.R., £2,591,521 L.N.E.R., £2,296,197 G.W.R., £1,838,667 Southern, and £157,385 Metropolitan. Ultimate rateable values (*i.e.*, after de-rating and other reliefs) upon which local rates are payable amount to £383,202 L.M.S.R., £250,633 L.N.E.R., £373,447 Great Western, £240,495 Southern, and £56,709 Metropolitan. The value which is de-rated (£3,800,000 approximately) provides the basis upon which payments are made by the railway companies into the Railway Freight Rebates Fund which finances the rebates in freight charges on the "selected traffics" which benefit from de-rating. In the rateable value total of £1,304,486 is not included the rateable value of dwelling-houses, hotels, places of public refreshment, and let-out premises owned by railway companies which are excluded from the railway valuation roll. Cumulo values for the purposes of the second roll, *i.e.*, for the period 1936-41, have been agreed (subject to representation and appeal) for the four main-line companies, as announced in the previous report, at £1,500,000 for the L.M.S.R., £1,100,000 for the L.N.E.R., £1,400,000 for the Great Western, and £1,150,000 for the Southern. The relevant accounting years for the ascertainment of the average net receipts for the second valuation roll are the years 1930 to 1934.

* * * *

London Transport Assessments

The valuation for rating of the transport undertakings of the London Passenger Transport Board is now governed by the Railways (Valuation for Rating Act), 1930, as adapted by the London Passenger Transport (Valuation for Rating) Scheme and Order, 1935. The first valuation under the scheme operates from April 1, 1936, and applies to all the transport undertakings of the board except motorbuses and road coaches, and therefore includes tramways and trolleybuses as well as the railways. For rating purposes the Metropolitan Line of the board has been temporarily in a different position from that of the District and tube lines of the former "Underground" group, inasmuch as the Metropolitan transport hereditaments have since April 1, 1931, been subject to the jurisdiction of the Railway Assessment Authority appointed under the Act of 1930, whereas the rating of the District and tube lines was until March 31, 1936, governed by the old parochial assessment system. In the report of the Railway Assessment Authority for the year ended March 31, 1938, it is mentioned that an apportionment scheme relating to London Transport assessments was confirmed by an order of the Minister of Health dated April 10, 1937, and that the authority is engaged in ascertaining the net receipts for the two years ended June 30, 1935, a task rendered none the easier on account of the pooling scheme with the main-line railway companies.

* * * *

The Week's Traffics

The only improvements shown in the past week's traffics of the four main line companies are one of £1,000 in passenger receipts on the L.N.E.R. and one of £1,000 in Southern coal earnings. On the passenger side there is a net decrease of £20,000, merchandise receipts are down £174,000, and coal traffic earnings are £76,000 lower, making a total decrease of £270,000 in comparison with the corresponding week of 1937. A week ago there was a net decrease of £238,000. To date the earnings of the four companies amount to £104,092,000, a drop of £3,529,000 or 3·28 per cent. To this decrease passengers contribute £254,000, merchandise £2,519,000, and coal £756,000.

	34th Week								Year to date	
	Pass., &c.		Goods, &c.		Coal, &c.		Total		Inc. or Dec.	
	£		£		£		£		£	%
L.M.S.R. ..	—	9,000	—	89,000	—	19,000	—	117,000	—1,478,000	— 3·41
L.N.E.R. ..	+	1,000	—	38,000	—	49,000	—	86,000	—1,204,000	— 3·82
G.W.R. ..	—	12,000	—	40,000	—	9,000	—	61,000	— 680,000	— 3·74
S.R.		—	—	7,000	+	1,000	—	6,000	— 167,000	— 1·14

Mersey Railway receipts for the week show an improvement of £120, and the aggregate to date is £148,025, an increase of £6,154.

* * * *

New York Central Railroad Company

During the first nine months of the year 1937 there was an increase in revenue of 6·45 per cent., but in the last three months there was an abrupt downward trend, and for the whole year the increase was only 1·43 per cent. The discrepancy of an increase in freight tonnage and a decrease in freight revenue results mainly from the

discontinuance on December 31, 1936, of the so-called emergency rates.

	1937	1936
Passengers	51,171,829	48,269,076
Revenue freight, tons	131,549,445	125,943,268
Miles operated	11,080	11,219
Operating ratio, per cent.	77·55	74·46
	$	$
Passenger revenue	66,405,564	62,575,824
Freight revenue	257,541,451	257,714,419
Railway operating revenues ..	366,226,126	361,063,872
Railway operating expenses ..	284,000,439	268,830,436
Net revenue from railway operations	82,225,687	92,233,436

Net railway operating income in 1937 was $36,028,267, a decrease of $9,250,358. Fixed charges were covered with a balance of $6,352,612.

* * * *

Dominican Republic Railways

There are only two railway lines open to public service in the Dominican Republic, namely, the State-owned Central Dominican Railway between Moca, Santiago, and Puerto Plata, 62 miles in length, on a gauge of 2 ft. 6 in.; and the British-owned Samaná & Santiago Railway between Sanchez, La Vega, and Moca, with a mileage of 87, on the 3 ft. 6 in. gauge. There are, however, in addition, some 265 miles of private railways of various gauges, owned by the sugar companies, each of which operates its own line for the transport of cane and similar purposes. According to the Report on Economic and Commercial Conditions in the Dominican Republic, published by the Department of Overseas Trade, gross receipts of the Central Dominican Railway in 1936 amounted to $110,438, made up of freight $84,988, passengers $2,135, wharf charges $19,933 and miscellaneous $3,382. Expenses were $97,077, and net revenue $13,361. The earnings of the Samaná & Santiago Railway have been affected adversely since the opening in 1922 of the highway system which has extended into the region served by the railway until the latter is now paralleled for the greater part. It has also suffered through the partial failure of the cocoa crop for two consecutive years.

* * * *

The Channel Tunnel

Few, we suppose, would say that the last word has been said on the subject of a railway tunnel between England and France—in fact, it is unlikely that the scheme will ever lack supporters until their enthusiasm is crowned by an opening ceremony. Half a century ago, however, the writer who forecast no further progress until nearly four decades of the twentieth century had passed, would have been classed as an incurable pessimist. In 1874 the French Tunnel Company secured a concession from the French Government and drove a gallery 1½ miles under the sea from Sangatte. An English Channel Tunnel Company was chartered in 1875 but did no practical work, and it was left to the South Eastern Railway to drive a 7-ft. tunnel for some 2,015 yd. from Dover under the powers of an Act of 1881. These works were taken over by the Submarine Continental Railway Co. Ltd. (incorporated on December 12, 1881) which in 1886 absorbed the older Channel Tunnel Company and in the following year took its name. Boring ceased in July, 1882, on Board of Trade instructions when 2,026 yd. of tunnel had been driven. The works were kept in good condition, and exactly 50 years ago a Board of Trade Report was issued, which stated that since the previous inspection (December, 1886) the Board of Trade had sanctioned the working of the boring machine in August, 1887. On that occasion 8 in. of chalk were cut out, bringing the length of the tunnel up to 2,102 yd. 2 ft. 8 in.

The "Forgotten Man" among Railway Employees

Some months ago we reprinted an editorial article from the pages of our American contemporary the *Railway Age*, with the title of "The Forgotten Man," in which an eloquent plea was put forward for the ordinary railway stockholder, who appears to be even worse off in America, if it were possible, than the British stockholder. In a second editorial article the *Railway Age* now refers to another "forgotten man," and this time it is the other unfortunate sufferer from depression, the employee of junior seniority status, who loses his job when retrenchments are necessary. The article points out that the alternative to these dismissals might well be an all-round cut in wages, but the older hands on the railways, with their undue influence in the unions, prefer to see the junior workers turned off rather than have their own pay reduced. The *Railway Age* recommends the sufferers to unite and use their collective influence to assist in the passage of legislation to remedy the depression and restore the economic position of the companies. From a mere onlooker's point of view, we would suggest, as we suggested before, that surely some remedy should be possible, in the richest country in the world, if only the sufferers from an artificial depression—stockholders and employees alike—would unite in their demands.

* * * *

The World Power Conference

Dr. Julius Dorpmüller, the Reich Minister of Transport, delivered the opening address at the International World Power Conference in Vienna on August 25, and spoke of the plans entertained by Germany, and made possible by the union between that country and Austria, for using the Danube as a source of hydro-electric power. The principal speech from the delegates was given by Sir Harold Hartley (a Vice-President of the L.M.S.R.), who is Chairman of the International Committee of the conference and leader of the British delegation. He maintained that the scientific application of power in the home during the present century had been a revolution as far-reaching in its own sphere as the industrial revolution of the nineteenth century. Sir Harold considered that the introduction of power for domestic purposes might be regarded as the repayment by the technician of a debt, long-overdue, accruing from the social consequences of mechanised industry. He drew particular attention to the international significance of the conference (to which Great Britain has sent the largest delegation), for sources of energy and raw material were unevenly distributed, and their economical use therefore a matter for international co-operation.

* * * *

An American Aerial Cableway

The passenger cableways that form such a familiar means of tourist access to the heights of Switzerland, Germany, and France, were unknown in the U.S.A. until recently, but a line has now been completed in the mountains of New Hampshire. It is 5,410 ft. long—slightly over a mile—and the difference in elevation between the valley and mountain stations is 2,007 ft. This line, which ascends the Cannon Mountains, near Franconia, was built for the New Hampshire Aerial Tramway Commission by the American Steel & Wire Company, a subsidiary of the United States Steel Corporation. The usual two-car arrangement has been adopted, and the cars, which each hold 27 passengers and an attendant, travel at a normal speed of 1,000 ft. per min. They are 12-sided cars, which the American promoters delight to call dodecagonal, and are fitted with special non-brittle lights. As the ascent is made in 5½ min., a total of 225 persons can be transported each way in an hour. Formerly

the ascent of this peak—over 4,000 ft. above sea level—involved a two-hour climb up a tortuous trail in order that the famous view from the summit might be viewed.

* * * *

The German Railways Today

There is no doubt about the truth of the assertion made by Sir John Simon in his speech on the European situation last Saturday that the peoples of the various countries are peace loving and regard war with nothing but horror and loathing. In existing circumstances, therefore, when the peoples of so-called democracies, by neglecting to exercise their sovereign power to express and enforce their will, permit drifting events to control their destiny, the possibility of war is never remote. All the more important then is it to avoid indulgence in ill-founded gossip of the supposed shortcomings of neighbouring countries, for such gossip might well produce just such an atmosphere for the precipitation of uncontrollable events. Lately there has been a tendency in certain quarters to disparage everything German, and as recently as our issue of July 22 we had occasion to draw corrective attention to certain untrue and misleading statements regarding German railways in a popular London daily paper. Since then we have made fairly extensive journeys on the Reichsbahn, and our experience has been that of the satisfied traveller. Punctuality was exemplary, the cleanliness of trains and stations and the courtesy of the staff on as high a standard as can be found anywhere, and so far from there being any deterioration in the service it seemed to us to be at least as good as usual.

* * * *

Assessing the Cost of Service Slacks

During recent years a close study has been made by engineers of the Belgian National Railways of time lost by trains owing to service slacks and other enforced speed reductions. From this study, and with the help of complex mathematical calculations, charts have been prepared representing the effect that slacks of varying severity may be expected to have on the normal running on level track of engines of different types with the customary range of loads. In an account of the methods adopted which appeared in the June issue of the *Bulletin of the International Railway Congress Association*, no details are given of the use to which these charts are put, but the chief purpose, no doubt, is that of deciding what allowance shall be made for service slacks in laying down the point-to-point timings of new train schedules. Interesting though such investigations may be, however, we doubt whether they justify the expenditure of time involved in the preliminary calculations needed for the preparation of the charts, which are concerned chiefly with the performance of steam locomotives. The one uncertain factor that may upset the whole of the statistics is the driver himself, for drivers do not always follow the same methods in their handling of locomotives, and with identical conditions of engine and load one man may recover far more smartly from a slack than another. However, the charts certainly set a standard of performance.

* * * *

Rail Lengths in the U.S.A.

It is often a matter for surprise to European railway engineers when travelling in America that American railways still content themselves in general with such comparatively short rail lengths as 33 ft. and 39 ft., as compared with the 60-ft. standard of Great Britain and the 24-m. (78-ft. 9-in.) and 30-m. (98-ft. 5-in.) rails now so freely laid in France and Germany respectively. Rolling mill equipment in the United States and Canada has largely been the determining factor, though standardisation of handling and maintenance methods, based on the 33-ft. and 39-ft. standards, has resulted in a number of American railways being now reluctant to make any change. In connection with the recent annual meeting of the American Railway Engineers Association, a questionnaire was sent out to all the railways participating, and out of 58 replies, 21 were still in favour of 39-ft. rails; 18, however, favoured double this length (78 ft.), and one railway desired it trebled to 117 ft.; ten lines desired 45-ft. rails, five a variety of lengths from 50 ft. to 66 ft., and three had no preference. Careful examination of laying and maintenance costs resulted in estimates varying from $3·89 to $6·20 per gross ton as to the savings ultimately to be expected by substituting 78 ft. for 39 ft. as the standard rail length; but these estimates were based on obtaining the longer rail from the makers at the same price per ton as the shorter.

* * * *

The General Utility Locomotive Again

For long past railway traffic officers have expressed a keen interest in, and desire for, what might be termed the "general utility" locomotive, the nearest approach to which is the mixed traffic type. As every locomotive engineer knows, it is impossible to combine all the virtues of several types in any one class of engine, and this, of course, is also realised by those responsible for the conduct of the traffic. Nevertheless, the topic arises periodically as a subject for debate, and we note that in the discussion of a paper entitled "Handling and Consumption of Coal" read by Mr. C. Case at a meeting of the South American Centre of the Institution of Locomotive Engineers, one of the speakers said he was in agreement with the author that engines should be able to haul reasonably large loads at peak periods and still be economical with lighter loads. As he said, a few years ago that was difficult of attainment, but today, thanks to the advent of modern refinements, with which Mr. Case included poppet valves, it is possible to work with steam cut-offs in the cylinders of between 3 and 88 per cent.; with proper design of steam passages, full boiler pressure can be delivered to the cylinders, and, if the exhaust arrangements enable back pressure to be minimised, full advantage can be taken of the expansive properties of the steam. These attributes, combined with the higher boiler pressures now used, have greatly increased locomotive efficiency.

* * * *

It Isn't Far from London

While welcoming the train service improvements forecast by the present widening of the Metropolitan & Great Central joint line between Harrow and Amersham, some regular travellers will deplore the threat to the individuality of the route. As a somewhat sinuous double track, the "Met. & G.C." seemed to preserve in many places along its course a rural calm long vanished from beside its four-track neighbours. Although in one sense a main line, being used by L.N.E.R. expresses to and from Marylebone, it has never attracted those regularly-spaced lineside hoardings advertising pills, and distempers for household decoration that march with other railways into London. Perhaps that shanty station among the woods at Moor Park & Sandy Lodge (already sadly transformed by the felling of trees) started the rumour that most of the traffic on the line is drawn from husky rustics dwelling in log cabins. The trees of Moor Park being doomed, it cannot be long before the chipped enamelled bath of Pinner shares their fate. For some years it has stood beside the railway, outside a whitewashed cottage among the hayricks. A bauble from the luxurious civilisation up the line, it here finds sterner use as a trough for ponderous cart-horses.

XUM

Railways and Industrial Development

A STRIKING feature of railway policy in recent years has been the assistance rendered to the cause of industrial development, particularly in the distressed areas. The efforts made by the railways in conjunction with local authorities, the Commissioner for Distressed Areas, the Special Areas Reconstruction Association Limited, and the Nuffield Trustees, have met with considerable success and there have been a number of instances where new industries have been established as a direct result of the enterprise and pertinacity of railway development officers. It has long been the practice of the railways to encourage the establishment of factories on the many desirable sites adjacent to their lines, and the experience thus gained has been of immense value during recent years when many of the most thriving industrial areas, such as South Wales, Lancashire, and the North-East Coast, became the victims of the financial stringency.

In Monmouthshire and South Wales the G.W.R. has played a prominent part in the resuscitation of industrial activity. This area, which was dependent almost entirely upon its coalfields, suffered very severely during the depression, and the fall in coal exports was much greater than from any other exporting district in Great Britain. The position was aggravated to a considerable extent by national policy, e.g., the application of sanctions against Italy, which deprived South Wales of an important customer for a lengthy period, and by foreign subsidised competition. It will be recalled that in July, 1936, Sir Robert Horne (now Viscount Horne), Chairman of the G.W.R., arranged a conference of the leading industrialists in South Wales to consider measures for assisting trade in the area. Arising out of this conference, the South Wales Trade Recovery and Expansion Committee was formed, which, in addition to presenting reports to the Government dealing with urgent matters affecting the coal and shipping industries, devoted attention to the establishment of new industries in South Wales. The extent of the success which has attended these efforts is revealed by the statement in the July issue of the *Great Western Railway Magazine* that, including the factories erected on the Government-assisted trading estate at Treforest, but excluding those erected by the Government itself, no fewer than 66 new factories have been put up in South Wales since November, 1936. On the Treforest Trading Estate alone, over twenty factories will manufacture a great variety of articles ranging from reinforcing steel for concrete, to gloves and leather bags, toys, typewriter ribbons, sweets, and roller-skates. Many of these industries have been brought to the area as a direct result of the G.W.R., which well deserved the tribute paid to the company in the editorial comments of *The Times* on the subject of distressed areas in November last.

The G.W.R. is not alone in this work, however, and the other three companies have all made valuable contributions to industrial development in the areas served by their systems. The L.N.E.R. has dealt with numerous inquiries for information relating to factory sites and premises in its territory, and much useful assistance has been given to manufacturers. In many cases, arrangements have been successfully completed for the establishment of new businesses or the extension of existing industries. Industrial development has been particularly marked in the north-east of England where the company has important interests, and several thousand people are now employed at the factories of the Team Valley Trading Estate alone. The L.M.S.R. is also devoting special attention to the question of industrial development, and the company's organisation includes an officer whose duty it is to assist manufacturers in search of vacant factory premises or industrial sites. There have been many encouraging developments, notably in Lancashire, Cumberland, and Lanarkshire.

The Southern Railway is in a somewhat different position from that of the other three companies, since it serves an area which, apart from London, is more residential and pastoral than industrial. The company has, however, taken important steps in connection with industrial development at Southampton, where it has a large estate of reclaimed land. Already progress has been made in the letting of sites for factories on this estate, and every effort is being made to develop it on the best possible lines. The company's policy is to keep the standard of factories on the reclaimed area as high as possible, and the success which has been achieved in this direction is evidenced by the fact that sites have been let to such firms as Heinz Limited, Cadbury Bros. Ltd., and General Motors Limited. With a view to indicating the type of accommodation which can be afforded, the company has erected two model factories and there can be little doubt that, given a period of more settled conditions, the success of this enterprise is assured. It will be seen that the British railways are taking an active and praiseworthy part in the work of industrial development and it is unfortunate that the present slump in trade should have occurred just when such admirable progress was being made. Enough has been accomplished, however, to prove the valuable part railways are able and willing to play in this work of National importance.

* * * *

The Conveyance of Glass

THE British railways convey many thousands of tons of glass annually, and the fact that the number of breakages is negligible is a tribute to the careful manner in which the traffic is handled and the smooth running of railway freight trains. The varieties of glass which the companies are called upon to convey are very numerous, and among those which require expert handling are plate glass for shop windows, window and horticultural glass, ornamental glass for use on the outside of buildings or shop-fronts, glass tubes for neon signs, glass furniture, and glass utensils for domestic purposes. For the conveyance of plate glass, the companies have provided special well wagons with capacities ranging from eight to thirty tons, some of them fitted with stanchions between which the sheets of glass can be loaded. Other glass traffic is regularly carried in ordinary railway vehicles, although a steadily increasing use is being made of containers for the conveyance of glass bottles and other small glass articles. The methods by which glassware is packed prior to dispatch by railway vary considerably. Sheet or window glass is packed in open crates or close boarded cases, the sheets being kept in position by straw, while rolled plate and rolled wire plate also travels in open crates with straw packing. In some instances rough plate glass is loaded in stanchion glass wagons without any packing between the individual sheets, as they are loaded horizontally and secured by felt-covered wooden frames on each side; these frames are kept in place by the stanchions, and the edges of the glass are wedged tightly.

Bottles and jars are packed securely in straw in mats, bags, wooden cases or cardboard containers, while to the depots of certain firms bottles are loaded singly in railway wagons and packed carefully with paper, thin wooden partitions being inserted to keep the loads intact. Even this small amount of packing can be dispensed with by the use of railway containers, in which glassware is frequently forwarded without packing material. Recently a consignment of 144,000 empty glass bottles was for-

warded in 43 containers from St. Helens to Norwich, and, although the bottles were entirely unprotected by packing material, less than one bottle per container was found to be broken on delivery. Containers have also been found most suitable for the conveyance of large consignments of small glass articles such as accumulator cells, flower pots, and so on. Pieces of machine-pressed glassware—of which a considerable tonnage is conveyed by the railway Continental services from Belgium, Luxembourg, Czechoslovakia, and Germany—when not travelling in containers are usually wrapped in tissue paper, wood wool or straw and then nested in half-dozens or dozens and packed in cardboard containers fitted with separate partitions. Glass tumblers are usually packed one gross to a carton, and in some instances corrugated strawboard partitions are used.

It is the general practice to convey glass traffic by the ordinary freight train services, but if the shape or size of a specific consignment is such that it can be carried only by special working, the railway companies arrange a service accordingly. Special arrangements are also made for the working of full trainloads of glass traffic between points where a heavy traffic is passing. Some idea of the extent of this traffic can be gained from the fact that the British railways convey 500 tons of glass bottles weekly from St. Helens to London, while daily consignments weighing 15 tons pass from Barnby Dun to Birmingham, and 30,000 consignments of special glassware are forwarded annually from Sunderland to all parts of the country. In addition there are regular heavy forwardings of window plate glass measuring up to 24 ft. in length, and the safety and expedition with which such consignments are conveyed is of decided assistance to traders generally.

* * * *

Ceylon Government Railway

DESPITE efforts made to regain lost traffic, competition by buses and lorries continued unchecked and uncontrolled during the year ended September 30, 1937, for which we have received the report by Mr. W. G. Hills, Acting General Manager. During the year under review the report of the Transport Commission was received and considered by a Sub-Committee appointed for the purpose, but the year closed without any appreciable steps being taken to place the road and rail services on a more satisfactory footing. Gross revenue in the year under review was lower by Rs. 444,610 or 2·65 per cent., but there was a reduction in expenditure of Rs. 454,333 or 2·37 per cent. Passengers increased in numbers principally because of the extension of excursion facilities, and season ticket revenue improved by Rs. 56,757 or 6·73 per cent.

	1936–37	1935–36
Miles open	951	951
Passengers	9,505,658	9,406,977
Merchandise, tons	896,098	895,238
Train-miles	4,253,226	4,267,976
Operating ratio, per cent.	114·82	114·48
	Rs.	Rs.
Passenger receipts	5,943,769	5,917,331
Merchandise receipts	8,624,370	9,189,755
Gross revenue	16,304,611	16,749,221
Ordinary working expenses	18,720,830	19,175,163
To renewals fund	1,634,213	412,651
Deficit	4,050,432	2,838,593

A new timetable providing additional trains and railcars, and involving noticeable accelerations, was brought into force on November 8, 1937. With the arrival of the diesel units, the coast line timetable was revised in March, 1938, reducing the journey time between Galle and Colombo by another 20 minutes.

Training the Masses

DURING a recent journey in the London suburban area, our attention was diverted from the somewhat unprofitable contemplation of our fellow passengers, and our ears pleasantly titillated by the following fratri-sororial dialogue, reproduced in considerably abridged form: "Oh, Alfie, *do* look at the streamlined engine, *and* the pretty boat-train!" "Oo-er, does the engine *really* go on to the boat, Maggie?" These naïve and unaffected utterances, which were provoked by some empty Southern Railway boat-train stock, drawn by a mixed traffic 4-6-0 locomotive and apparently wending its placid way to Clapham yard, set us thinking. It suggested, for instance, that the modern adolescent may be a terrible swell at assimilating history dates, grappling with isosceles triangles and declining *mensa* (with but two errors), but is still grievously backward in railway lore. Talking about "stokers" and "luggage trains," asking Traffic Superintendents what time the 5 o'clock train to Lordnoseware starts; trying at least six wrong platforms in the face of multitudinous notices and stentorian directions, and wondering how engine-drivers steer round curves—here are but a few more of the *gaucheries* and *gaffes* committed by otherwise sane and "knowledgeable" people, both young and old, when railways steam into their ken.

This is, no doubt, a baleful legacy from inept forebears, and we are of the opinion that, in order to prevent posterity from reaping a further harvest of ignorance, schools should modify their curricula without further ado. We have had the pleasure of describing the commendable policy of the London Midland & Scottish Railway authorities, who, through the medium of their School of Transport, are giving every employee a chance of sharpening his wits on the academic grindstone, and of eventually becoming, if we may use the jocose term, a "Derby Bright." Based on this sound premise, our natural conclusion is that seats of learning are quite capable, without revolutionary changes, of restoring the "derailwayised" (we shrink from saying "derailed") minds of ignorant multitudes to the track again.

Discarding much that is *vieux jeu* and effete, they might incorporate in its place really edifying subjects, among which we venture to propose the following: "Buying a ticket"; "Finding the platform"; "What makes a train go"; "How to tell a locomotive-engine from a beer-ditto"; "Luggage—its vagaries"; "Excess Fares," and "Compartment Etiquette." Finally (and not initially as at present), pupils might be instructed in their "A.B.C." contemporaneously with the railway companies' public timetables and, of course, *Bradshaw*—with special emphasis on the *errata* and pitfalls with which this noble work is teeming.

Parents, until proved proficient, should not, we submit, be permitted to stultify the cultural progress of their young by "helping" with homework, but we see no reason why the B.B.C. should not co-operate in the great campaign; the inclusion in its interrogatory syllabus on Monday night of, say, the following: "Do you know what a diamond crossing is? Is it (*a*) a hybridised gem; (*b*) a Belisha Beacon in Park Lane; (*c*) a species of railway track lay-out; (*d*) a Contract Bridge convention? would, we feel sure, considerably enliven "Puzzle Corner." But, by whatever means such indubitably serviceable knowledge is inculcated, unless and until an ex-'Varsity *alumnus* can proudly announce to the world that he has secured a First in Through Carriage "Greats," or a First Class Vacuum Brake Tripos, with special honours in Communication Cords, we shall still maintain that his education has been sadly neglected.

XUM

LETTERS TO THE EDITOR

(The Editor is not responsible for the opinions of correspondents)

Fire Effects in Steel Coaches

Caledonian Club,
St. James's Square
August 15

TO THE EDITOR OF THE RAILWAY GAZETTE

SIR,—I enclose three photographs recently received from a friend in China, which may be of interest to car designers and others. They show cars which have been set on fire by Japanese incendiary bombs. The first two are of recently supplied Canton—Hankow cars, all-steel with wood interior finish, and the third of an older car having wood body with a steel underframe. My friend's covering letter contains the following relevant passage:—

"... when these (the all-steel) cars burn the whole frame goes and you cannot do much with them afterwards, but with an ordinary wooden bodied car with steel frame, you can start and build a new body at once or use them as flats, for which there is an unlimited demand now. Whenever a wooden body of a freight car is badly damaged we cut the top off and use them as flats."

The reason for the lack of damage to the underframe of the wood-bodied car is, of course, that the truss rods are beneath the fire and remain cool, whereas in the steel car—in which body and frame are one—heating of the metal causes softening and buckling, allowing the frame to sag.

It is a little hard to expect car designers to produce cars which are bomb- as well as collision-proof at a reasonable price, but the world appears to be reverting to the law of the jungle, and car designers must move with the times.

If, therefore, the extra expenditure for steel cars is considered justifiable, the comparatively small additional cost for the use of a non-inflammable material for the major part of the interior finish may also be considered advisable.

Yours faithfully,
KENNETH CANTLIE

[Some snapshots of both types of coach received with our correspondent's letter are reproduced on page 409.—ED. *R.G.*]

The Flying Scotsman

Newcastle-on-Tyne
August 24

TO THE EDITOR OF THE RAILWAY GAZETTE

SIR,—In the letter published in your August 11 issue concerning the disproportionately easy timings of the Flying Scotsman and other L.N.E.R. London—Edinburgh trains north of York, "Veritas" might have added even more weight to his argument by pointing out that a number of these trains carry heavier loading between Newcastle and King's Cross than they do between Newcastle and Edinburgh. During the winter months the up Flying Scotsman, for example, almost invariably has one or two coaches added at Newcastle, which come on to the front of the train with the engine that works the train on to London.

On the other hand, he did not mention the speed restrictions imposed on East Coast trains owing to pitfalls or colliery subsidences between Ferryhill and north of Morpeth, which doubtless have some influence on the timings, and some of which have been put on since the war. These might account in part for the considerable differences quoted between the respective reductions that have been made in the train times north and south of York respectively, though obviously not for the whole of these differences.

Yours faithfully,
NOVOCASTRIAN

[It is, we believe, correct to say that the main line between Ferryhill and Alnmouth is at the present time more free from pitfall slacks than it has been for years past. The only serious one at present operative, apart from Durham viaduct, which may be regarded as permanent, is near Lamesley, 4½ miles south of Newcastle. The Longhirst slack, north of Morpeth, has long since been withdrawn, and the Annitsford slack was taken off some time ago; Browney Colliery slack, south of Durham, has recently been lifted to a considerably higher figure, and the slack near Plawsworth has also been eased. The only appreciable loss of time at present by colliery workings is thus confined to the short stretch between Durham and Newcastle.—ED. *R.G.*]

Timetables

99, Clifton Road, S.E.25
August 21

TO THE EDITOR OF THE RAILWAY GAZETTE

SIR,—May I express a word of appreciation for your article on timetables? Doubtless the present productions are issued in the same gay spirit that leads the railways to scald their well-wishers' fingers with boiling water from a tap labelled "C," or to install geysers which, instead of hot water, belch forth clouds of steam. But ultimately, we may hope, the companies will come to see the commercial value of clearer exposition, in the same way that writers of textbooks are now at pains to see that their works are no longer a mere chaos of learning.

One of the four main-line groups already uses an elaborate system of head-codes to identify the trains as they come into the platforms. In a timetable showing several services on the same page, probably it would clarify matters to label each column with the head-code of the service shown therein. Doubtless the cost of colour printing as a means of classifying columns would be prohibitive. But, in the case of railways not using head-codes, it should not be difficult to devise a system of distinctive shading—vertical, horizontal, and diagonal lines, &c.—that would enable consecutive trains of a particular service to be picked out from an involved page with much greater speed and facility than at present.

With regard to the question of bulk, to which you also make reference, no doubt it is too much to expect that copies of the timetables should be distributed, like the telephone directory, in places where the traveller could have convenient access to them without causing congestion at booking or inquiry offices. But there should be little difficulty or expense in issuing off-prints of the pages relating to the various components of each main-line group, in much the same form as in the days before amalgamation.

Alternatively, arrangements might be made to provide passengers completing a certain stipulated mileage with a haversack, satchel, or other suitable container for the present ponderous tomes, in the same way that purchasers of various proprietory beverages or foods are equipped, on amassing the requisite number of coupons, with utensils suited to their storage, preparation, or consumption.

Yours faithfully,
K. H. JOHNSTON

"Holwood Corner," 60, Rafford Way,
Bromley, Kent, August 20

TO THE EDITOR OF THE RAILWAY GAZETTE

SIR,—May I endorse the appeal in your article in your August 19 issue for simpler timetables? Of all the ways you mention in which the Continental timetables are clearer than our own, I should like to stress the system of train numbering: this, more than anything, simplifies the task of tracing a train from one table to another and of ascertaining exactly what through carriages, restaurant cars, or sleeping cars are attached thereto.

In Great Britain train numbering seems confined to special excursions and main-line working at peak holiday periods, and even then is only for the benefit of the railway staff, whereas abroad every train has its number and is known

by it to the travelling public also. As a typical example of what happens in England let us take, at random, the case of the 9.10 a.m. from Liverpool to Penzance, which may be known as the " 12.43 p.m. from Hereford to Bristol " or the " 6 o'clock Plymouth to Penzance," according to the section of line over which the traveller is wont to use it, while to a railwayman in the West of England it will be more familiar as the " 1.10 p.m. Crewe ": under the Continental system it would be referred to by all and sundry as " Train No. so and so "; how much less confusing.

Whilst on the subject of simplification, might it not be opportune to advocate once again the adoption for timetable purposes of the 24-hr. clock system and thus eliminate the confusion of signs such as "a.m.," " p.m.," " morn.," " aft," " night " and " evening," to say nothing of the line between the figures to indicate " p.m.," introduced by the L.M.S.R. and, incidentally, the only attempt made hitherto towards the avoidance of confusion in this direction.

Both the Southern and the L.N.E.R. use the 24-hour notation in their Continental timetables (including the British connections) and tourist agents use it as a matter of course in the itineraries given to their clients going abroad, and all who use it are in agreement as to its undoubted benefits. The foreigner does not have to speak of having his dinner at 19.30, any more than we need do, but he does not run the risk—through too hasty a glance at his timetable—of turning up for an evening train, only to find that it left at 7.30 in the morning and the last service to his distant destination is at 19.05.

Yours faithfully,
ARTHUR M. S. RUSSELL

PUBLICATIONS RECEIVED

Canadian Pacific Facts and Figures.—Montreal: Canadian Pacific Railway Company. 8 in. × 5 in. 256 pp. and map.—The Canadian Pacific Railway Company has published and issued a series of books, some original, some reprints, under the title of " Canadian Pacific Foundation Library," and the first volume is appropriately devoted to a description of the great company and its affairs, under the title, " Canadian Pacific Facts and Figures." The Foundation Library as a whole was reviewed in our issue of August 26. Compiled and edited by the company's Publicity Department, the present volume seems to contain everything of interest relating to the history of the railway, its officers and staff, and its past and present operation. A photograph of Sir Edward Beatty, the Chairman and President, as frontispiece, is followed by reprints of his messages to the staff on the occasion in 1935 of the fiftieth anniversary of the completion of the railway between Montreal and Vancouver. A detailed history of the formation of the company and the progress of construction of the railway, with biographical notes of its past presidents, is accompanied by charts showing the organisation of the staff. Then follow descriptions of the traffic and how it is handled, on both railway and steamships and in hotels, all written in the form of friendly advice and information, rather than instruction to the staff. We learn that in Canada alone there are 165 clubs and associations organised and run by the employees of the company, and in this chapter of the book there is evidence again of the world-wide extent of the C.P.R. interests, in the shape of other clubs and organisations maintained by the company's employees in London, Liverpool, Hamburg, and other places even more remote. In other respects the book serves as a useful work of reference, containing abstracts of the company's balance-sheet and revenue returns, from which, incidentally, we learn that, although the company's gross earnings in 1912-13 were nearly the same, net earnings in 1937 were only half as much, owing to the increase in working expenses. The book contains a good small-scale map. No price is mentioned, and it is understood that the volume is intended to be issued to the employees of the company on easy terms of payment.

The Passing Scene (London-Portsmouth-Isle of Wight). London, 1938: The Southern Railway Company, Waterloo station, S.E.1. 8 in. × 6 in. 24 pp. Illustrated. Price 3d.—This low-priced route book for the journey by electric train from Waterloo to Portsmouth deserves an extensive sale. Both cost and size have been nicely judged for the purpose, that of lending new interest to the 90-min. run by fast electric train from London to the coast. A larger work might be judged too elaborate a purchase for so comparatively short a journey, and in any case would not achieve the convenient slimness for the pocket.

Most of the text is printed on right-hand pages, facing a sketch map showing stations and distances printed in white upon a background of relevant views in half-tone. The narrative, in addition to colourful descriptions of scenery and historical anecdotes, reflects something of the sensations of travel instead of being a mere recital of interesting features. The purchaser will, therefore, be likely to read the book through for pleasure before his journey begins, and so, by being prepared for what he particularly wants to see, save the strain upon brain and neck occasioned by darting frantic glances to and from the printed page and the lineside as points of interest recede at a mile a minute.

Reinforced Concrete for Storage of Liquids.—The Department of Scientific and Industrial Research published in 1933 " Recommendations for a Code of Practice for the Use of Reinforced Concrete in Buildings." This has now been amplified by further recommendations relating to the use of reinforced concrete for reservoirs, tanks, and structures for the storage of fluids. After referring to certain points in connection with imperviousness, cracking, and corrosion in the introduction, the new code states in Section 1 that, in considering structures for the storage of liquids, water has throughout been held in mind. The recommendations are, however, generally applicable to liquids and solutions which have no detrimental action on the concrete. Section 2 deals with materials, Section 3 with design, and Section 4 with construction. There are also a number of appendices. Copies are available from William Clowes & Sons Ltd., 94, Jermyn Street, London, S.W.1, at 1s. 6d., post free, to members of the Institution of Civil Engineers, and 2s. 6d. to non-members.

L.M.S. Statistics.—An interesting tabulation of figures relating to the activities of the L.M.S.R. during 1937 is contained in a leaflet entitled " The Greatest British Railway: Some L.M.S. Statistics," which the company is distributing among passengers on its principal express trains.

Quartet in Steel.—We have received an advance notice of " Quartet in Steel," a book, produced under the joint authorship of Messrs. Horace Greenleaf and Howard Hayden, which, it is stated, bridges the gap between the elementary and the technical in literature dealing with railway subjects. This volume presents an intimate picture of railway working. It traces the progress of British railways through the past 150 years; outlines the many ramifications of the modern companies; and explains such things as the working of a locomotive, the meaning of signals, the history of the pullman car, and the reason for electrification projects. The reader travels with the driver and fireman on an express engine; watches the chef and stewards at work on a dining car; looks inside a Travelling Post Office; walks along the permanent way; and follows in the wake of a high speed train on its journey acrross England. " Quartet in Steel " is 62,000 words of informative reading, illustrated with more than fifty photographic reproductions. Originally the book was planned for use in schools, but the publisher—Frederick Muller Limited, 29, Great James Street, W.C.1—decided that it should also be available to the public, and has therefore produced an attractive edition at the popular price of six shillings. Mr. Greenleaf is a member of the staff of the Southern Railway Advertising Department.

XUM

THE SCRAP HEAP

The annual coal consumption of the L.M.S.R. is 5,500,000 tons, representing constant employment for 18,000 miners.

* * *

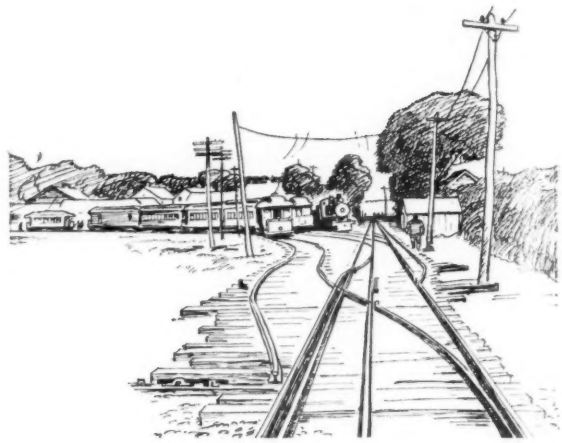
The execution by bandits of 26 members of the Mexican Union of Railwaymen is reported in a telegram received by the union from Acamabaro, in the State of Guanajuato. The bandits held up a railway construction gang. The captives were asked whether they were union members or not. Those who belonged to the union were then murdered and the non-union workers were freed.

* * *

The main line of attack on Irun, it was decided, was to be on the Puenta bridge and Fort San Marcial, and to carry this out there had to be established a road for supplies behind this front. The Reds had blown up the Enderlarza bridge over which this road runs, and by artillery and air raids hindered it being rebuilt. The Nationalists then took a bold but simple step which heightened my opinion of their engineers. They abandoned the road, and tearing up the rails on the light railway which leads from Irun to Vera, they converted the railway into a first class road. Electric light was installed in the tunnels, and for the weeks the attack lasted there was never any difficulty in getting supplies to the front. —*From "The March of a Nation," by Harold G. Cardozo.*

* * *

From the columns of our American contemporary, the *Railroad Magazine*, we reproduce an interesting little sketch of a three-gauge railway. The accompanying text explains that the Cincinnati, Georgetown & Portsmouth RR. was built in 1885 as a steam-operated line of 3 ft. gauge. In 1901 part of the track was converted to standard gauge (4 ft. 8½ in.) and a branch was built to the local street-car (tramway) gauge of 5 ft. 2½ in. The system was then completely electrified and the illustration depicts the points at Carrel Street, Cincinnati, Ohio, in 1902. A few years ago the undertaking was abandoned.



A three-gauge railway in the U.S.A.

During a recent week-end 16,500 sandwiches were sold in Paddington station refreshment rooms. For every one beef sandwich, 32 ham sandwiches were bought.

* * *

Since the opening of the Empire Exhibition at Glasgow in May last, the railways have run no fewer than 2,300 excursions to Glasgow from all parts of the country.

One Hundred Years Ago

Extracts from the September, 1838, issue of "The Railway Magazine" (afterwards "Herapath's Railway Journal") and the oldest constituent of THE RAILWAY GAZETTE

Newcastle & Carlisle Railway.—From June 18, the day on which this line of sixty miles was opened, with the exception of a short period when some silly individual was enabled to arrest, by injunction, the operation of the company, the receipts have been gradually increasing. They are now £1,500 per week, or £78,000 per annum. Their estimated traffic before Parliament was only £28,000 per annum.

Great Western Railway.—Since the opening of the line between Paddington and Maidenhead, from June 4 to August 12, a period of ten weeks, the receipts have amounted to £15,974 3s. 4d. for the conveyance of 100,222 passengers, with a few carriages and parcels—a result which can scarcely fail to be satisfactory as to the future sufficiency of traffic when the company shall be enabled to multiply their trains, and afford the full advantages of the railway to a very populous district within a few miles of the metropolis. At the first opening of the line, the directors fixed eight daily trains each way (excepting on Sundays) at such intervals as might comprehend the principal traffic during the day. The incomplete state of the road rendered it necessary for a time to diminish that number of trains. Until recently, seven only of the long coaches have been working on the railway, to which another is now added.

Birmingham Railway.—On the 20th [August] a large party of directors and shareholders left the Birmingham station at 6½ hours, a.m., and arrived at Euston-square at 1 p.m., having spent 1½ hr. in viewing the works, and 5 hr. in travelling the 110 miles, which is at the rate of 20 m.p.h. From Birmingham to Coventry, 18¾ miles, was performed in 36 min.; thence to Rugby, 11 miles in 22 min.; thence to Denbigh-hall, 35 miles in 2 hr. 10 min; and from Denbigh-hall to London, 48 miles in 1 hr. 54 min.; or 5 hr. 2 min. in all!—*Midland Counties Herald.*

London & Birmingham Railway.—The proprietors have already been informed, that a company, formed exclusively from the shareholders of the London & Birmingham Railway, is about to construct an hotel and dormitory on the vacant ground in front of the Euston station, a special meeting of proprietors of the London & Birmingham Company having passed resolutions authorising the lease of the ground for the proposed object. The buildings have been let by contract, and are about to be commenced. The Directors for the time being of this company will, in pursuance of the conditions of the lease and deed of settlement, have a permanent control over an undertaking, the main object of which is to promote the success of the railway by providing for the comfort of families and individuals who travel on it.

Liverpool & Manchester Railway.—At the late general meeting of this company, the dividend was at the rate of 9 per cent. per annum. The principal feature of their generally harmonious meeting was a proposal to raise the salary of Mr. Booth, the secretary and treasurer, from £1,000 to £1,500.

Grand Junction Railway.—During the last four months the performance of the journeys has become much more regular; and the directors report that the permanent road, and the works in general, are in excellent order. The passenger-station in Curzon-street, Birmingham, is in rapid progress, and will be completed in a few months. In the meanwhile arrangements have been made for the convenient transfer of passengers to and from London, at the station of the London & Birmingham company.

OVERSEAS RAILWAY AFFAIRS

(From our special correspondents)

SOUTH AFRICA

Maize Crop Estimate

As a result of drought conditions in certain districts of the maize belt, the Union's 1938 maize crop will be slightly below normal. According to the latest official estimate, only 17,600,000 bags will be produced, against over 28,000,000 bags harvested last year. The 1937 season was, however, an abnormally good one, having eclipsed the previous record crop by some 3½ million bags.

Flash-butt Welding of Rails

The South African Railways intend in future to use only 120-ft. rails for all relaying and new construction work, and for this purpose several flash-butt welding depots are being established for the purpose of welding short rails into the required lengths. The first depot has begun operation at Danskraal, near Ladysmith, and several miles of the Natal main line have already been relayed with 120-ft. rails. The difficulty of transporting rails from the flash-butt welding depots to the points where they are to be placed in the track is being surmounted by the use of special bolster wagons.

New Seaplane Base at Durban

South Africa will shortly have a fully-equipped up-to-date seaplane base at Durban, where arrangements are being made for the replacement of the temporary seaplane facilities at Salisbury Island by a permanent base at Congella, adjacent to the graving dock. A contract has been let for the supply and erection of the steelwork for the large hangar which is to house the seaplanes, and another contract has been entered into for the extensive excavation work involved. Apart from the hangar, the permanent facilities include a slipway and workshops, Customs office, baggage room, and other accommodation. The whole work is estimated to cost approximately £60,000.

United States Expert Studies Operating Methods of S.A.R.

An American expert on railway signalling methods is on a visit to the Union to obtain a general knowledge of the train operating methods of the South African Railways. He finds that the physical features of the two countries are not very dissimilar, and that the operating conditions in South Africa are comparable with those met with in many parts of the United States; both countries have a very large mileage of single track with its attendant problems of single-line train operation. While the electric tablet or staff system of working is in general use on the South African Railways, the method favoured in America for many years has been the train order system, from which C.T.C. (Centralised Traffic Control) has recently evolved.

The stage has been reached in the Union where the capacity of certain single-line sections will shortly require to be increased, and the opportunity is being taken to discuss whether the adoption of some improved method of train control, such as C.T.C., would not be a more economical proposition than doubling the track.

INDIA

Extension of Travancore State Transport System

The State Transport Department of Travancore Durbar, though inaugurated only a short time ago, is making commendable progress in developing communications. The circuitous route by which Travancore tea from the high ranges of Munnar is brought to Tuticorin for export consists of 14 miles by aerial ropeway, 11 miles by car, 150 miles by rail and 7 miles by boat. It has been stated in the Legislative Council that the State Transport Department has in hand a scheme which will provide a direct service to Cochin.

Railway Air Service

The Nizam's State Railway was the first railway administration in India to operate road services, and this railway is again about to make history as the pioneer in railway-operated air services. An Aviation Section has been added to the Agent's office at Secunderabad, and plans for the inauguration of co-ordinated air services are maturing rapidly.

UNITED STATES

City of Los Angeles Express Changes

This streamlined diesel-electric express of the Union Pacific and Chicago & North Western Railroads has recently had two extra cars added to its standard composition, making eleven in all in place of nine formerly. [The train was described and illustrated in our issue of August 27, 1937. —Ed. *R.G.*] The two new cars are an all-room Pullman sleeping car and a chair car.

First Light-Conditioned Car

Another change in the train is the conversion of a coach into an observation car, as there has not been one on this train hitherto. This car is finished in copper, and is unique in having 27-in. circular Polaroid disc windows, 29 in number, by means of which passengers can regulate the intensity of the sun's rays entering the car. In each of these windows there are two Polaroid discs, the outer one fixed, and the inner one capable of being revolved by means of a handle; the adjustment of the intensity of the sunlight is effected by turning the inner disc.

Other changes in the composition of this train are, according to the *Railway Age*, as set forth in the following table:—

Original composition	*New composition*
1 mail baggage car	1 mail, baggage and dormitory car
1 baggage, dormitory and kitchen	2 chair cars
1 diner-lounge	1 diner-kitchen
4 sleeping cars	1 dining car
1 de luxe coach	5 sleeping cars
1 coach buffet car	1 observation car

It is significant that the coach buffet car and de luxe coach have disappeared, and that there is additional dining accommodation in the new train. Two diesel-electric power units still haul the enhanced load.

BRAZIL

Paulista Railway in 1937

The Paulista Railway continues to be worked most efficiently. During the financial year 1937 receipts totalled 125,522:529$769, whereas expenditure was only 75,093:949$214 so that the operating ratio was fractionally better than 60 per cent. Net receipts were thus 50,428:580$555, which sum together with the surplus carried forward from 1936, gave a credit balance of 66,428:580$555 admitting of the payment of a 9 per cent. dividend. After payment of loans, amortisation of external debt, interest on imported materials, &c., 2,383:455$800 were paid over to the employees' Pension Fund, 825:758$800 was set aside for the Reserve Fund, and 1,803:256$470 for the Afforestation Department Fund. A sum of 16,000:000$000 was carried over to the current year's account.

Estrada de Ferro Santa Mathilde

In accordance with the terms of the concession, reported in The Railway Gazette of January 7, by which this railway was rented for a period of five years for the transport of manganese, the firm of A. Thum & Co. Ltd. has handed over 200 steel wagons of 50 tons load, 5 Texas locomotives, and 5 others of the Santa Fé type, to the Central Railway.

ARGENTINA

Fatal Level Crossing Accident

A level crossing accident, in which 10 persons were killed and 5 seriously injured, one of whom has since died, occurred on the night of July 9, at Coquimbito, in the Province of Mendoza, when a locomotive belonging to the Buenos Ayres & Pacific Railway ran into an omnibus at a level crossing, the road vehicle being completely destroyed and all the passengers either killed or injured. It is stated that the engine of the omnibus stalled while the vehicle was crossing the line, and the attention of the driver being occu-

XUM

pied with the restarting of the mechanism, he failed to notice the approach of the locomotive until it was too late to avert the catastrophe.

FRANCE

Telephonic Information Bureau

A central telephonic information bureau in Paris, recently organised by the S.N.C.F., has met with great success. The bureau gives information to travellers concerning trains and fares and also to manufacturers and traders relative to carriage of goods and freight charges. A bewildering variety of questions are answered with celerity. A single telephone number, Laborde 92·00, easily remembered, serves for all calls. Within ten seconds the caller is placed in communication with the person who can give him the required details; the service is highly appreciated. On the opening day, July 9, the calls numbered 1,250. On July 26, the calls rose to 4,000, and on August 1 to 6,857.

Situated at the S.N.C.F. headquarters, 88, rue St Lazare, the bureau comprises a standard grouping of 35 telephone lines operated by four expert telephone girls. Fifteen employees in a spacious and well-lighted hall, are kept busy all day answering calls. Partitions and ceilings are covered with sound-absorbing paper made of fine saw-dust, suppressing all echoes. A dictionary of passenger services, specially compiled by the S.N.C.F., serves as a reference book for all information concerning timetables, winter and summer resorts, excursion tickets, week-end and Sunday tickets for the six zones within 100 km. of Paris and a variety of miscellaneous details.

Business Enquiries

Information for business men is also supplied by Laborde 92·00 through the central goods office at 27, rue de l'Echiquier. There experienced employees consult the general schedules of goods tariffs. Enquirers are quickly given the most advantageous rates and routes for the transport of farm produce, coal, fertilisers, or other goods from one town to another, or to and from North Africa.

The S.N.C.F. since August 1, has also opened 10 additional railway enquiry offices in Paris bringing the total number in the city to 46, in addition to the ordinary station enquiry offices. To cope with the rush of passenger traffic, which began on August 5 when many thousands of workers began their paid holidays, the S.N.C.F. set up temporary offices in the Citroën, Renault, and other works. Seats were booked in advance and the data thus obtained helped the station staffs to make up trains accordingly. Workers, who had never been accustomed to take holidays, were given advice as to seaside and inland resorts suitable for their families and the prices charged in hotels and boarding houses. The S.N.C.F. intends to carry its enterprise still further, and before the end of the year a wireless broadcast for railway passengers will be organised. This promises to be a revolutionary departure in advertising railway travel services.

NORWAY

Reorganisation of the State Railways' Management

After lengthy discussion, the Norwegian Parliament has adopted a plan for reorganising the administration of the State Railways, submitted to it by the Government. This considerably modifies the arrangements in force hitherto, notably as regards the nomination and composition of the central body, the powers of the General Manager, and the regulating of staff matters. The central administration will in future consist of six members besides the General Manager, that is to say three—instead of five hitherto—nominated by Parliament, two nominated by the King, and one chosen from among themselves by members of the staff, through qualified representatives.

Contrary to the practice hitherto, the heads of technical departments will not be members of the Central Management, and certain posts of this kind may be abolished. The General Manager will be appointed for six years; the chief purchasing officer will come directly under his orders.

There will be a staff and pensions committee consisting of three departmental heads and two staff representatives, who will deal with all matters hitherto the province of the central administration on this subject; however, the divisional managements will retain control of such matters in the same degree as before.

SPAIN

Tariff Unification

The *Gaceta de la República*, of Barcelona, publishes under date of July 24, a Ministerial Order of July 18 relating to the project of a general unification of railway tariffs. The preamble refers to the joint report—framed in accordance with the orders of the National Committee—of the traffic superintendents of the principal lines, but, while recognising the value of the report and the necessity for the unification, the preamble explains the difficulty of putting it in force without first giving the railway users a voice in the matter, a difficult matter in present conditions. Nevertheless, the preamble continues, the immediate desirability of some form of unification is evident, and in these circumstances it is necessary to resort to a provisional expedient. Article 1 therefore authorises, in principle, the immediate unification of all the general tariffs on all the nationalised lines that constitute the system operated by the National Council. Article 2 postpones the public report which will eventually be made, and Article 3 lays down that, temporarily, the rates and charges and conditions of application of the general tariff approved by Ministerial Order of August 18, 1935, for the National Western Company, shall be applied on all the lines owned by the State and operated by the National Council, except the merchandise classification which shall be that drawn up by the traffic superintendents as a part of their above report, and approved by the Council. The *Gaceta* gives no date for the coming into force of the Order.

PORTUGAL

Northern Railway Concession

A Decree dated July 25 authorises the bases for a new contract between the State and the Northern Railway of Portugal Company, under which the concession of the railways operated by the company will be unified and merged in one single concession. The lines concerned are the following: (*a*) Oporto to Póvoa and Famalicão; (*b*) Trofa to Guimarãis and Fafe; (*c*) Senhora da Hora to Trofa; (*d*) Boa Vista to Trindade; (*e*) Leixoes to S. Gens; and (*f*) Vale do Tâmega, to Baúlhe.

CHINA

Construction Work Continues

In spite of the war, a certain amount of new construction work is still proceeding rapidly. For instance the Hengchow (Henyang)—Kweilin branch line, taking off the Canton-Hankow Railway at the former station, is expected to be completed by the end of August. This line which is about 250 miles in length was approved only in June, 1937, and the survey of it was completed in September or October of that year, when, presumably, construction work began. The new line will connect Kweilin, the capital of Kwangsi Province and Yungchow-fu, an important town near the Hunan—Kwangsi border, with the main cities still in Chinese possession.

THE NEAR EAST

Reduced Return Fares between Egypt and Palestine

Under an agreement between the Egyptian State Railways and Palestine Railways, ordinary first and second class reduced-fare return tickets for adults and children will be issued between May 15 and December 15 of each year, and the return portions of these tickets will be valid for 30 days, including the date of issue. They are obtainable at Cairo, Alexandria, Port-Said, Ismailia and Suez Stations to Jerusalem, Haifa, Jaffa, and Tel Aviv, and *vice-versa*.

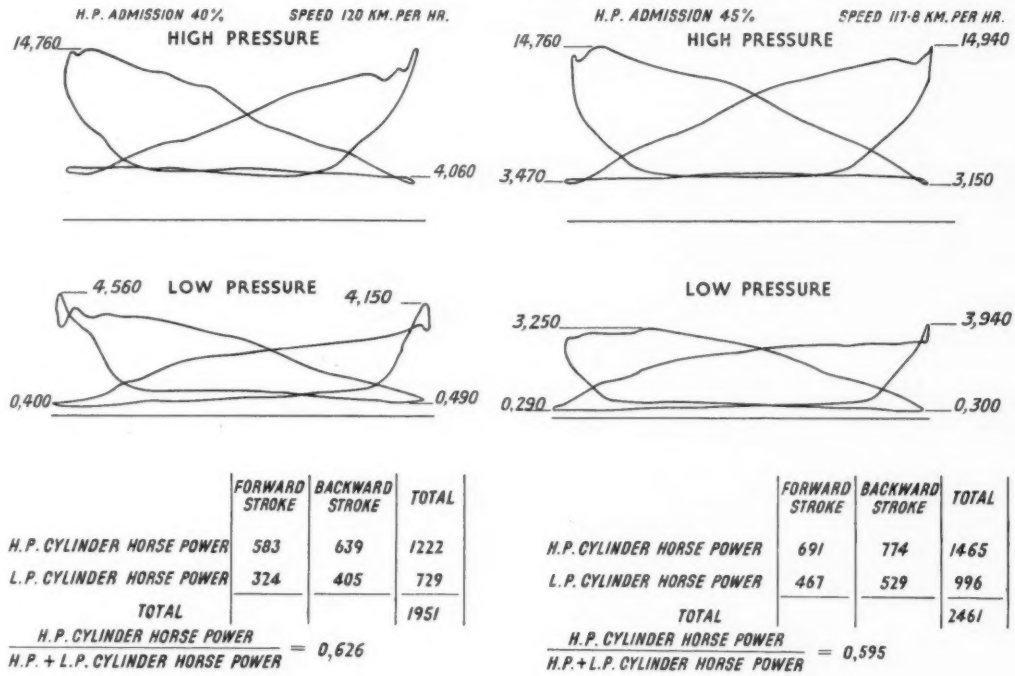
IMPROVEMENTS TO P.L.M. EXPRESS ENGINES

Notes on means leading to greatly increased efficiency of Pacific type locomotives in the South-Eastern Region of the French National Railways

IN May, 1937, we gave a short account of the history and development of the P.L.M. 231.G and 231.H standard Pacific locomotive classes. The basic type 231.C of 1912 had independently controlled high-pressure and low-pressure valve gear, a boiler pressure of 227 lb. per sq. in., and was equipped with a superheater. Subsequent engines were built with non-independent valve gear for the sake of simplification and are known as class 231.D. The maximum drawbar horsepower of these engines at 62 m.p.h. was 1,570. The 231.G type has new l.p. cylinders with large steam passages, double blast pipes, new light-weight composite piston valves, and mechanical lubrication, and we gave brief particulars of the results of tests, showing an increase of power of 35-55 per cent., according to the speed. The 231.H type is further modified to carry a boiler pressure of 284 lb. per sq. in., with correspondingly smaller high-pressure cylinders, and is equipped with a Dabeg economiser and an improved type of superheater, This gave a further increase of power of 16 per cent. at 62 m.p.h. and 21 per cent. at 74·5 m.p.h., and over a course of 12½ miles at 62 m.p.h., 3,321 i.h.p. was indicated at a cut-off of 60 per cent. M. A. Parmantier* has published fuller particulars of this systematic programme of modification, and of the test results achieved.

Trial was made of a number of exhaust arrangements, including variable blast pipes with a movable portion having three, four, and six wings, a chimney of large diameter, and exhausts without petticoat and with one or two petticoats. It was found that a considerable gain resulted from an exhaust column of large diameter, a "cross-bar" exhaust nozzle with four wings to augment the surface of contact between the steam and the exhaust gases, large sections of passage for the gases of combustion, and a petticoat to even out the combustion on the grate. Thus the diameter of the chimney was increased from 356 mm. to 500 mm., and with a net blast pipe orifice area of 172 sq. cm. instead of 120 sq. cm. as formerly, the same smokebox vacuum was produced with a reduction of 50 per cent. in the back pressure in the cylinders. To avoid the inconvenience of having a blast pipe of so wide a diameter in the smokebox, a double exhaust (P.L.M. type) was adopted, which showed a still further gain.

These results, however, were obtained with the new l.p. cylinders having an increase of approximately 10 per cent. in the cross-section of the steam passages, and as unfortunately no tests with modified exhaust equipment were made on the 231.C locomotives with the original cylinders, no indication is available as to the part played by the new cylinders in the reduction of the back pressure. It is probable that it was an essential factor; the double blast pipe is really an invention consequent upon improved cylinder and valve gear design, which reduces the in-



	FORWARD STROKE	BACKWARD STROKE	TOTAL
H.P. CYLINDER HORSE POWER	583	639	1222
L.P. CYLINDER HORSE POWER	324	405	729
TOTAL			1951

$$\frac{\text{H.P. CYLINDER HORSE POWER}}{\text{H.P. + L.P. CYLINDER HORSE POWER}} = 0{,}626$$

231-D type

	FORWARD STROKE	BACKWARD STROKE	TOTAL
H.P. CYLINDER HORSE POWER	691	774	1465
L.P. CYLINDER HORSE POWER	467	529	996
TOTAL			2461

$$\frac{\text{H.P. CYLINDER HORSE POWER}}{\text{H.P.+L.P. CYLINDER HORSE POWER}} = 0{,}595$$

231-G type

Comparative indicator diagrams

* In the *Revue Générale des Chemins de fer.*

effective drop in pressure through the exhaust ports themselves. An important result of the improvement of the effectiveness of the exhaust is that a much stronger and more even smokebox vacuum can be maintained than before, and in consequence the rate of evaporation of the modified locomotives can be increased to 102 kg. per sq. in. of heating surface per hour, representing an increase of available power of 45 per cent., obtained by working the engine continuously at a high-pressure cut-off of 55 per cent.

The tests were carried out at constant speed on the track, and on the Vitry test plant, at two test speeds in each case, namely, 100 and 120 km.p.h. (62 and 74·5 m.p.h.). It is natural, in view of the nature of the modifications, that a much greater improvement in performance was recorded at the higher speed, and we reproduce two sets of indicator diagrams for comparison, from which the effect of the modification to the low-pressure cylinders will be clearly seen. It must not be overlooked that in the case of the 231.G diagrams the high-pressure cut-off is 45 per cent. as against 40 per cent. for the 231.D, but in one sense this affords a more representative comparison since, as already mentioned, the locomotive can be run continuously at 10 per cent. greater cut-off than in its original form. For the same power the water consumption is reduced by 6 per cent. at 100 km.p.h. and 10 per cent. at 120 km.p.h., whilst the fuel consumption is reduced by 18 per cent. and 20 per cent. at the respective speeds. These figures indicate that at the more moderate speeds the effect of the more even draught on the efficiency of combustion exceeds the improvement in the efficiency with which the steam is utilised.

Such results are of great interest. Their value would be much enhanced if the full details of the test observations could be published. It is generally recognised that any engineering test results of importance ought always to be accompanied by all the essential data. Only so can a proper appraisement of their significance be made, and the full contribution to our knowledge be realised from the work involved in the testing.

A further modification to the locomotives of type 231.G at present under trial is a reversion to independently controlled high-pressure and low-pressure valve-gears, the engines so altered forming a new class 231.K. The question has arisen as to whether with the more efficient performance now obtained with these machines the sacrifice for the sake of simplicity involved in combining the control is not too great, especially under conditions of light loading. It is not possible to maintain a speed of 75 m.p.h. with a shorter l.p. cut-off than 50 per cent., which means in the case of combined cut-off control a h.p. cut-off of 40 per cent. and therefore necessitates throttling at the regulator valve. With independent control, however, it is easily possible to maintain a speed of 75 m.p.h. with the h.p. cut-off brought back to 20 per cent. and the low-pressure cut-off still at 50 per cent., giving a more efficient performance under these conditions. It is also proposed to equip one engine of the 231.K type with Dabeg poppet valve gear actuated by oscillating cams, which may afford an alternative solution of this difficulty.

COLOUR-LIGHT SIGNALS IN GERMANY

Precautions against failure

IT seems likely that in the near future colour-light signals will replace the ordinary semaphore and disc type on certain main-line sections of the Reichsbahn; in a recent issue of the *Zeitschrift für Eisenbahn-Sicherungswesen*, provisional technical regulations governing their use are given, of which we reproduce the principal points below as they are typical of the great care taken to avoid failure, so characteristic of this class of work in Germany.

Light signals on main lines are to be fed with d.c., derived from rectifiers where a.c. mains exist in the vicinity or a single-phase traction power supply. Duplicate rectifiers are to be provided for a signal box, group of boxes at a station, or, at times, for two stations close together. Half-voltage is to be supplied to the signals at night—unless the weather is thick—and the change-over switch is to be in the box nearest the power supply.

Accumulators are to be floated across the rectifiers and must provide fully 36 hr. power supply should the mains fail. Every group of rectifiers is to have a standby petrol generator set, with two engines, capable of carrying the full load as well as charging the accumulators. Any interruption of working, either of rectifiers or generator sets, is to be signalled by lamp indicators and audible alarms. Where there is no mains supply, two complete groups of accumulators are to be provided, each able to take the load for 36 hr., and fed by a charging set, with another in reserve to serve either group; separate buildings are always to be erected for this part of the equipment to keep noise and fumes away from the signal box.

Isolated light signals are not to be installed, but complete sections of line are to be converted, so that mixed signal indications are not seen. Groups of signals where lines come together are to be treated as a whole, and any colour-light stop signal must have its distant signal converted also. The indication " Proceed at reduced speed " (at junctions, &c.) is to be given by a yellow flashing light instead of the two green lights of the present semaphore signals. All red light units must have a reserve unit with them, switched in on failure of the first. All signal indications are to be repeated in the signal box and fused there, the signalman being able to replace a fuse after breaking a seal.

Drawings will be issued by the Central Technical Office in Berlin covering all details of design and installation work; only lamps obtained through headquarters are to be used. Leads to the signals will be in cable. Existing mechanical detectors worked in signal transmissions are to be transferred to separate detector (bolt) levers and the automatic train control equipment is to be connected up to continue working as hitherto when the light signals are brought into use.

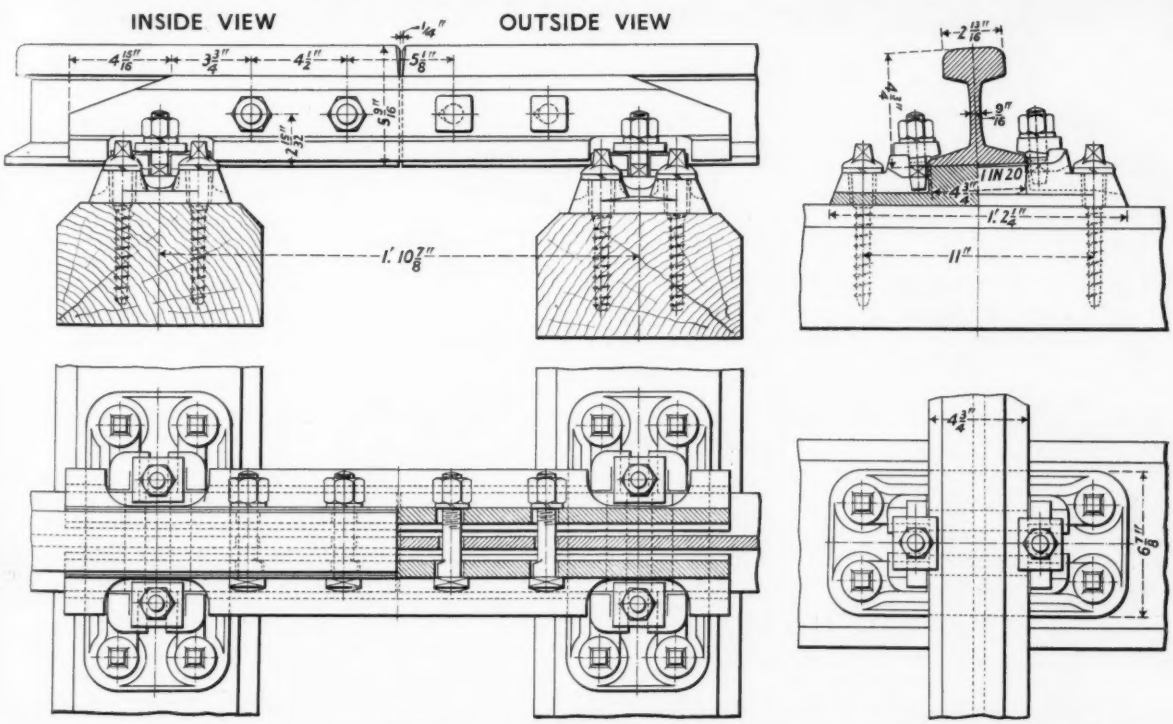
FLYING SCOTSMAN OF 1888 TO GO ON TOUR.—The L.N.E.R. has arranged for the Stirling locomotive No. 1 and the period Flying Scotsman train of 1888 to be placed on exhibition at various points on the system. It will be shown at Alexandra Palace station, London, on September 14 and 15; and at Manchester Central on September 19 and 20. Thursday and Friday, September 22 and 23, will see the engine and train at Sheffield where it will be stabled for inspection at the Park depot. At Leeds arrangements have been made for the exhibition to form part of the celebrations of the first birthday of the West Riding Limited streamlined train, and No. 1 will be seen with the record-breaking Pacific *Mallard*. The Stirling locomotive and train are also to be shown at Norwich during Civic Week, October 24 to 29.

NETHERLANDS RAILWAYS PERMANENT WAY

WHEN several decades ago heavier and faster trains were introduced in Holland, improved permanent way was called for, and the late Mr. E. C. W. Van Dyk, then Chief Engineer of the old Netherlands Central Railway, introduced an experimental section of British bull-head track. The difficulty of keeping the wooden keys tight decided the company against adopting this type of track but led to the introduction of a cast iron soleplate with flat-bottom rail, thus obtaining the main advantages of the bull-head type of construction without the disadvantage of wooden keys. The type of track then evolved having proved entirely satisfactory was ultimately adopted without alteration as standard on the main lines of the amalgamated railways now the Netherlands Railways Company. As the drawings show, the foot of the rail is held to the soleplate by means of clips with bolts and nuts and spring washers, independently of the fixing of the latter by means of coach screws to the sleepers. Thus the removal of rails from the track is accomplished merely by the loosening of the rail fastenings, those to the sleeper not being disturbed as is necessary where spikes or coach screws perform the combined purpose of holding both rail and soleplate in position. The rail joint used with this type of track includes a long fishplate supported on the joint soleplates. The principle of this Netherlands type of rail support has subsequently been adopted in Germany and elsewhere, although, as a rule, instead of cast iron soleplates steel plates are used.

General view of Netherlands main-line permanent way

Standard rail joint construction



Rail fastening arrangements, showing how the foot of the rail is held to the soleplate by bolted clips, independently of the coach-screw fastening between soleplate and sleeper

NEW SADDLE TANK LOCOMOTIVES, N.W.R. (INDIA)

These engines, which are oil-fired, weigh 7 tons and develop a tractive force of 2,174 lb.

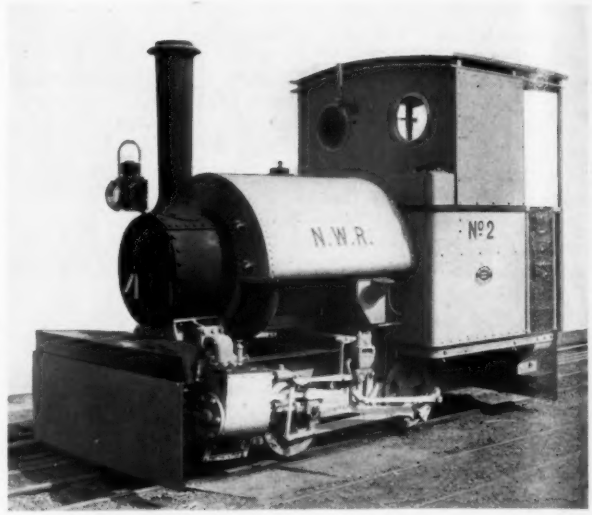
TWO small saddle tank locomotives were built recently by W. G. Bagnall Limited of Stafford for the North Western Railway of India, 2 ft. 6 in. gauge. They are for working in the yards of the creosoting plant at Dhilwan, and have to negotiate curves of 70 ft. radius. With a maximum axle-load of 4½ tons, each engine can haul a load of 35 tons on the level at a speed of 8 m.p.h. A special saddle casting between the cylinders, which acts as a frame stretcher and carries the front end of the boiler, contains the steam and exhaust pipes, and supports a combined steam and exhaust pipe in the smokebox with branch duplex pipes between the saddle and the cylinders. Axlebox guides are carried between the main frames and form frame stretchers or stays. Steam distribution is effected by overhead slide valves actuated by Walschaerts gearing.

The following are the principal dimensions:—

Cylinders, dia.	6 in.
Piston stroke	9 in.
Wheels, dia.	1 ft. 7 in.
Wheelbase	3 ft. 6 in.
Heating surface—	
Tubes	80 sq. ft.
Firebox	9 ,, ,,
Total	89 ,, ,,
Grate area	3·25 sq. ft.
Working pressure	150 lb. per sq. in.
Weight of the engine empty	6 tons.
,, ,, ,, in full working order	7 tons 2¼ cwt.

The tractive effort of the locomotive at 85 per cent. of the boiler pressure is 2,174 lb.

The boiler, fed by two No. 3 Gresham & Craven combination ejectors, is of the bull-head type constructed to comply with the Indian Boiler Regulations for a working pressure of 150 lb. per sq. in. It has a steel firebox and steel tubes, and is provided with two 1½ in. diameter Ross pop safety valves, one set of water gauges, and two try cocks. The regulator valve is in the dome, which is mounted on the firebox. The boiler is arranged for burning liquid fuel with a Kermode burner with brick arch, and the bottom and back portions of the firebox are lined with firebrick. The fuel tank holds 40 gallons of oil, sufficient for the engine to run 50 miles a day, and the saddle tank 100 gallons of water. Steam and hand brakes are fitted.



New **0-4-0** *shunting locomotive, N.W.R., India*

NEW SOUTH WALES RAILWAYS AND THE 150TH ANNIVERSARY

A Government Railways exhibit including scale models of locomotives, a diesel train, automatic electric signalling, rolling stock, and all kinds of equipment

AS mentioned in the notes published in THE RAILWAY GAZETTE of July 22 last, the State of New South Wales this year celebrated its 150th birthday. The first intensive period of the celebrations began in January and terminated in February. The second and concluding period extended from April 9 to 23 and included the Easter holidays. The Sydney Royal Easter Show each year attracts hundreds of thousands of visitors from country and city, but this year, as a gesture befitting the occasion, the society responsible staged the most impressive show in its history. Over 1,000,000 people passed through the turnstiles to view the various spectacles. Two new pavilions, the Commemorative and the Manufacturers', were opened. The erection of these was financed by the State Government. Housed in the Commemorative Building were displays from the neighbouring States, New Zealand, Canada and the Island Possessions.

Railway Exhibits

The New South Wales Railways staged an exhibit which attracted perhaps greater attention than any other exhibit in the show. Included in the display were scenic representations of the countryside, both in movement and still, working models of rolling stock and signalling equipment in operation, photographic, and statistical records of railway progress in New South Wales, models of waterfalls with unusual lighting effects, etc. A feature that attracted much attention was a demonstration of the safety of modern automatic electric signalling, staging two miniature trains following one another over a sectionalised scenic track under actual running conditions, controlled by signalling complete in every detail. Scale models of various types of locomotive, passenger and goods stock, including the N.S.W.G.R. diesel train, the Silver City Comet, were displayed. Souvenir discs, by the turning of which distances to and information concerning all provincial towns are given, were distributed free to spectators.

The celebrations of necessity threw a tremendous burden upon the Railway Department. The passenger figures have not yet been finally analysed, but it is confidently expected that all previous records will have been broken. One interesting consignment dealt with by the department was received on April 24 at the conclusion of the show

Models of typical New South Wales rolling stock

Map of the system and models of other typical features of it

Scenic representation of the countryside

Photographs of typical scenes on the system and current posters

NEW SOUTH WALES GOVERNMENT RAILWAYS EXHIBITS AT SYDNEY 150TH ANNIVERSARY FAIR

period. A special express train was arranged to convey blood-stock, including racehorses, yearlings, and show animals from Sydney to Victoria and South Australia. A total of 103 horses was consigned having an estimated value of over £100,000. This was probably the most valuable consignment of stock ever handled on the system. The horses were accompanied by owners, trainers and attendants for whom first and second class sleeping accommodation had to be provided. The horseboxes and coaching stock made up a load of 359 tons which was hauled by a "36" class engine. The train left Alexandria at 2.50 p.m. and arived at Newmarket in Victoria, approximately 600 miles distant, at 10.50 a.m. next day, an average speed of 30 miles an hour being maintained despite the break of gauge at Albury.

(*See illustrations on page* 405)

ALL-STEEL WAGONS FOR SOUTH AFRICAN RAILWAYS

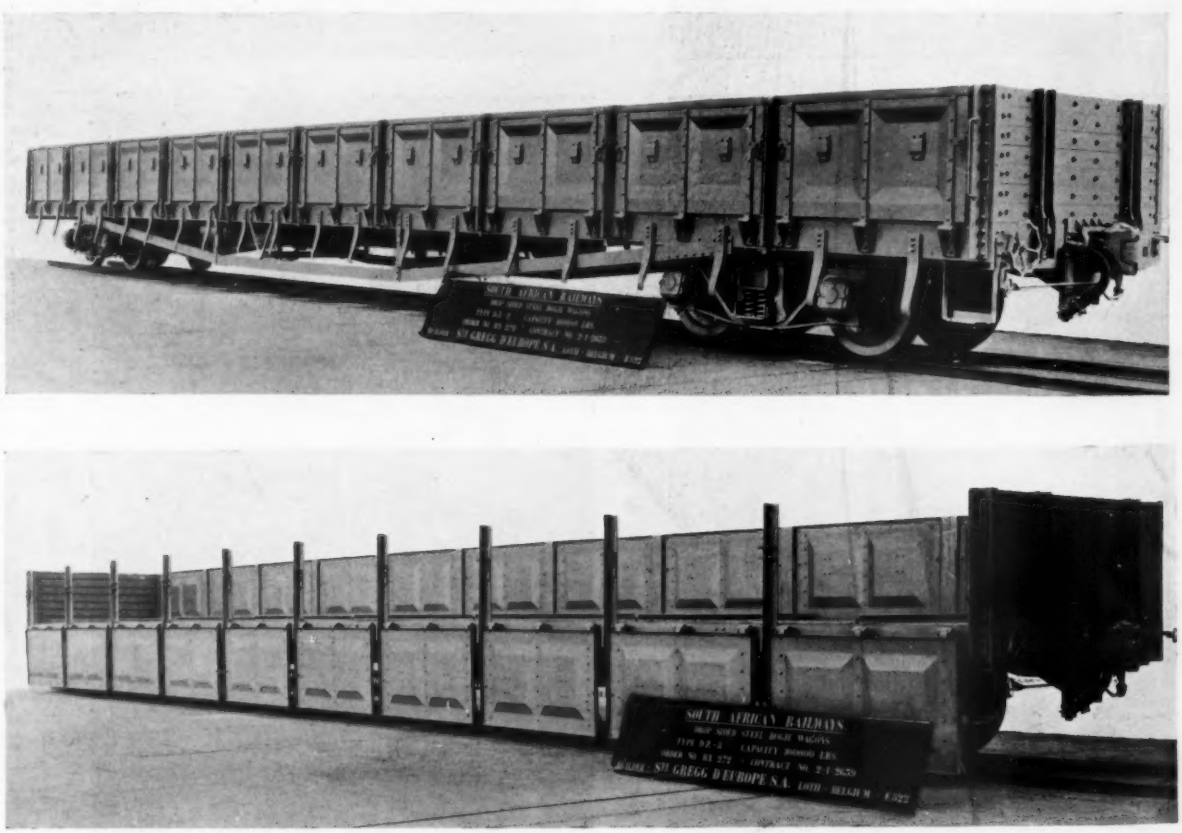
Drop-sided high-capacity type largely built of high-tensile steels

THE Société Gregg d'Europe, S.A., has recently built at its Loth (Belgium) works some all-steel drop-sided wagons for the South African Railways. High-tensile steel is largely used in their construction, the central girder plates being of Manten steel from the United States Steel Corporation, and the profiles, &c., of Ducol steel supplied by Colvilles Limited, Glasgow. The general dimensions are as below. The length and width are particularly noteworthy considering the wagons are built for the 3 ft. 6 in. gauge.

Length over headstock	63 ft. 0 in.
Bogie centres	47 ft. 6 in.
Width inside	7 ft. 6 in.
Height inside	2 ft. 11⅜ in.
Tare weight	52,400 lb. (23·4 tons)
Capacity	100,000 lb. (44·6 tons)

The wagons were primarily constructed for carrying 60-ft. rails and other long materials, but are fitted with drop-sided doors for coal or other bulk commodities when required. The side stanchions can be folded down to avoid obstruction when loading or unloading, and the end walls are removable for handling rails or other loads longer than 60 ft.; for this purpose special arrangement of the vacuum stand pipe and bottom-operated couplers were necessary. The underframes were built with a camber of 2⅝ in.

Murray friction draft gear was fitted to these wagons, and the vacuum brake specification included two 24-in. cylinders. As far as possible, S.A.R. standard details were used in the design. The vehicles were constructed to the designs of Mr. W. A. F. Day, Chief Mechanical Engineer of the railways. Messrs. Everett & Harle were responsible for the inspection and testing of the materials and the finished wagons.



New all-steel drop-sided wagons for South African Railways. In the lower illustration the side doors are seen dropped for loading

MECHANICAL ACCOUNTING ON THE NEW ZEALAND RAILWAYS

A description by Mr. W. Bishop, Chief Accountant, of the system of accounting in force

IT has taken many years to build up the accountancy system of the New Zealand Railways to its present high state of mechanised efficiency, but this system is now a notable feature of operations of the Railway Department and creates a great deal of interest nationally. This was recently demonstrated, when the best attended meeting in the history of the Wellington branch of the New Zealand Society of Accountants—with an attendance of 250 members—was held in the rooms of the Railways Accountancy Branch at Wellington station to see demonstrations of the largest installation in the Dominions of mechanical aids to accounting and other operations on figures.

Punching cards on Powers automatic key punchers

In a room with a floor space of more than 2,000 sq. ft., there are 44 machines, including key-punchers, sorters, tabulators, calculators, adders, Addressographs, book-keepers, and a Multigraph. Altogether the Accountancy Branch occupies a floor space of 13,240 sq. ft., and the staff, including travelling auditors, numbers 120, of whom 60 are women.

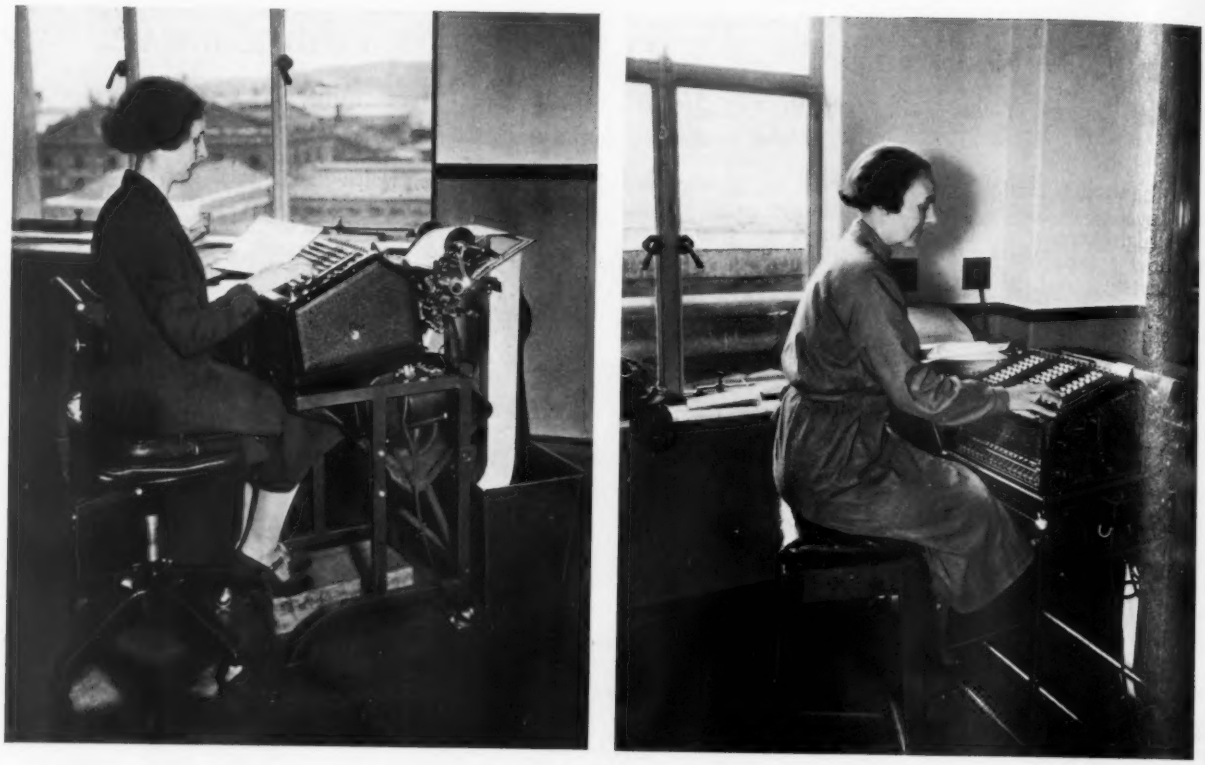
Mr. G. H. Mackley, General Manager of Railways, in welcoming the members of the society, said that his staff and himself had felt very proud when a colleague, Mr. H. Valentine, had been elected President of the New Zealand Society of Accountants, which included a number of railway officers.

The Chief Accountant (Mr. W. Bishop) referred to the wide range of statistical and accounting work required for an enterprise, which had a total staff of more than 22,000. He remarked that all the accounting work could not possibly be centralised in the head office, but the work was so organised that it was all controlled and audited by his staff. The Controller and Auditor-General also had a representative permanently attached to the office. Altogether, every possible precaution was taken to ensure accuracy of operations and to safeguard the department from fraud. In addition to the audit work carried on in the Chief Accountant's office, there were travelling audit inspectors attached to his staff. They visited each station, and made an intensive check of all the accounts at least once a year.

Prior to 1925 the railway accounts had been kept on a cash basis, and no provision had been made for depreciation. Then Mr. H. Valentine completely reorganised the accounts, and provision was made for depreciation and for the accounts to be kept on a double entry basis. A complete system for the compilation of accounting and statistical data was evolved in keeping with that adopted by the English and American railways. By using mechanical methods, wherever practicable, it had been possible to prepare this data without increasing the staff or cost.

The Helpful Budget System

Mr. Bishop mentioned that the budget system was in operation in connection with the railway accounts. Four-



Two varieties of Burroughs calculating machine in service on the New Zealand Government Railways

Powers sorting machines in foreground, and tabulating machines near the windows

weekly budgets were prepared by district officers for their expected expenditure for the ensuing four weeks. These budgets were submitted to the respective heads of branches for perusal, and revision if necessary. A committee consisting of the heads of the operating branches and the Chief Accountant then met and the various increases and decreases were discussed. If the committee was satisfied that the budget was reasonable, it was passed for submission to the General Manager for approval. The great benefit of budgetting was that district officers and heads of branches were kept constantly in touch with the many items of expenditure, and were in a position to reduce any proposed expenditure which was not considered essential. The actual results when available were compared with the estimates, and were also dealt with by the budget committee. The costing system in the railways workshops enabled the foreman to know how they were getting on with various jobs day by day.

Live Figures for Guidance

"As you go through our office tonight you will see our method of compiling statistics and the uses to which they are put in the final cost statements prepared and issued to all controlling officers," concluded Mr. Bishop. "Our endeavour is to produce live figures and not merely historical records; this is possible only by using up-to-date machine methods. You will find many different makes and types of machines, each of which has been obtained for a particular purpose. Where a large volume of routine work is involved, the job is studied, and, if practicable and economical, a machine is procured. You will find many instances where machines are doing what would otherwise be very laborious jobs. I would specially draw your attention to two high-speed calculators which work at 900 revolutions a minute, and which I find are real time-savers. You will find in the exhibits income and expenditure accounts, cost statements, and statistical data for all branches of our operations, including all our subsidiary undertakings. All these statistics would lose much of their value if compiled only for the whole service. It is necessary that the data should be prepared for suitable areas so that the controlling officers can make the best possible use of the information."

List of Mechanical Appliances

The following mechanical appliances are in use by the railways:—

Chief Accountant's Office: 2 Addressographs, 2 Graphotypes, 10 calculators, 11 card punching machines (Powers), 3 sorters (Powers), 4 tabulators (Powers), 1 Protectograph cheque writer, 2 bookkeeping machines, 8 adding machines, 1 Multigraph.

Outside Offices: 4 typewriter bookkeeping machines, 8 duplex adders, 24 simple adders, 3 calculators.

FIRE EFFECTS IN STEEL COACHES

A correspondent's letter on page 396, describes the comparative effects of incendiary bombing on Chinese all-steel and steel-underframe wooden-bodied stock during the present war. He sends the snapshots from which these illustrations are made to illustrate his remarks

Above and right: Two all-steel coaches burnt out as a result of hits by incendiary bombs. The buckling effect of the whole structure and the sag created are clearly seen

Left: The steel underframe of a wooden-bodied coach after the body had been entirely consumed by fire resultant from incendiary bombing. It will be seen that the alignment of the frame and truss bars are not appreciably affected

XUM

AMERICAN GRILL CARS

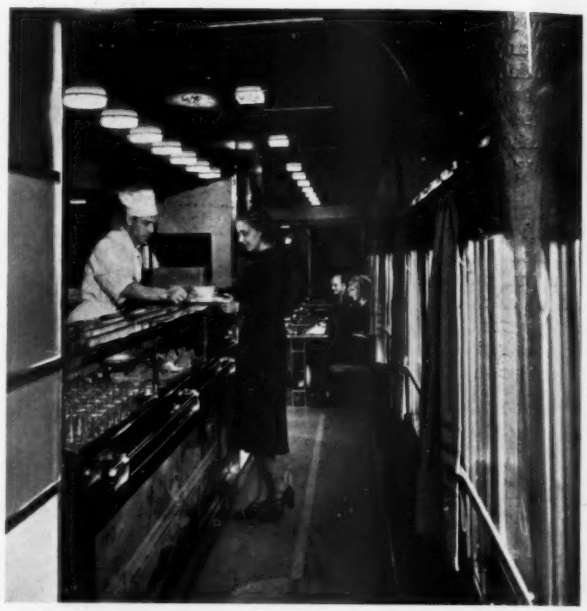
To supplement the ordinary dining cars, the New York, New Haven & Hartford RR. has acquired five new grill cars specially designed to provide attractive service

THE N.Y.N.H. & H.RR. has recently purchased five grill cars from the Pullman-Standard Car Manufacturing Company, as briefly described in THE RAILWAY GAZETTE of December 31 last (page 1247). The object of placing these vehicles in service is to supplement the ordinary dining cars, and to attract, by charging popular prices, passengers who do not ordinarily patronise the diners.

The cars are of the same construction as the company's streamlined coaches, measuring about 81 ft. by 10 ft. over body, and are air-conditioned and seat 57 persons. At each end is a café compartment, one with 12 tables, the other with 13, and between them a central kitchen-pantry with a serving counter, where patrons may choose from a variety of hot and cold dishes, sandwiches, and so on. At one end, facing one of the café compartments, is a bar where ice cream, soft drinks and liquors are served.

The serving counter is modern in design and of stainless steel, chromium, and glass. A glass panel, 10 ft. × 2 ft., in front of the counter is etched in relief to represent a map of the company's New England shore line. It has other illustrations of a clipper ship, a whale and a group of trees as well as the streamlined train of which the car forms a part.

In the kitchen, steaks, chops, &c., are broiled over a charcoal grill provided with forced draught. A new type



Service counter, and café compartment beyond

Bar and soda fountain in café compartment

of vegetable steamer is installed with a sealed chamber such that the mineral properties and original fresh flavour are retained. A new scientific method is adopted for coffee making in which the coffee is allowed to reach peak percolation in a separate urn, and is then automatically drawn into a second unit which retains the full flavour. Electric fudge warmers, electric mixers, and refrigerated beer coils for draught beer are provided, as well as mechanical dish-washing equipment.

There is a staff of six in each car: a bar steward and dish-washer, counterman, smartly attired hostess, and two assistants, who will serve refreshments at the tables if desired. Photo murals depicting various scenes in New York and New England adorn the ends of the cars. The floor is covered with red linoleum with a design in grey strips, and the table tops are black with three vermilion stripes running lengthwise. The walls are silver with vermillion stripes above and below the window lines; upholstery is in black and vermillion.

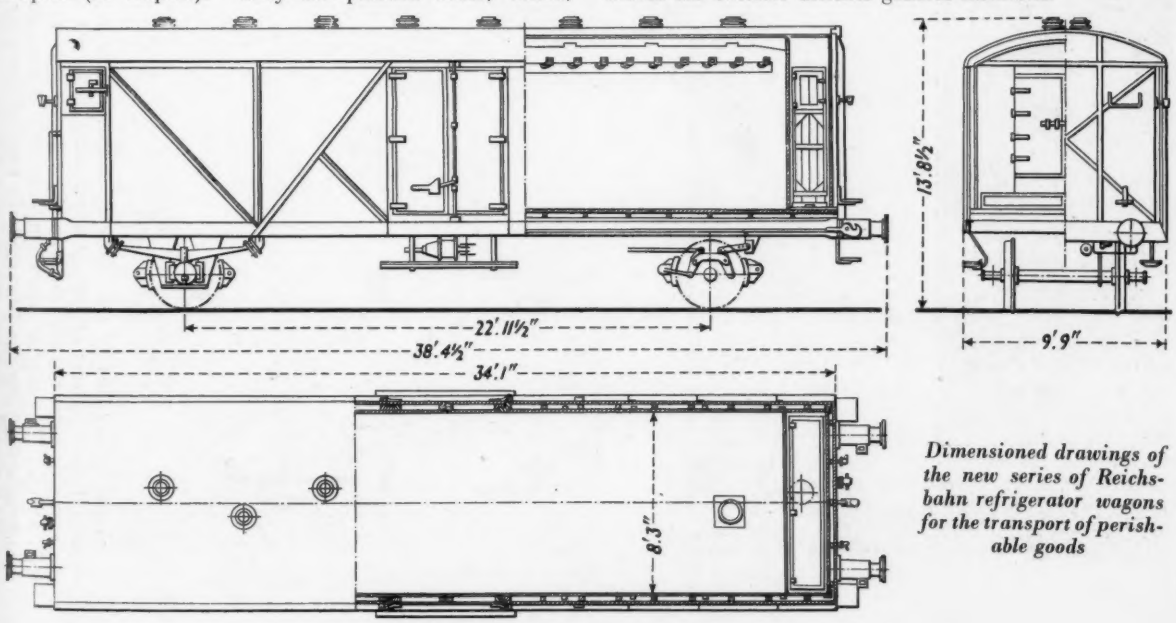
Typical menus in these cars include a 35-cent (1s. 6d.) breakfast of orange juice, bacon and egg, coffee and rolls; a 60-cent (2s. 6d.) lunch of lamb chop, two vegetables, sweet, rolls and coffee; and a toothsome short dinner at the same price.

GERMAN REFRIGERATOR WAGONS

A series of new cars for perishable traffic recently placed in service on the German State Railway

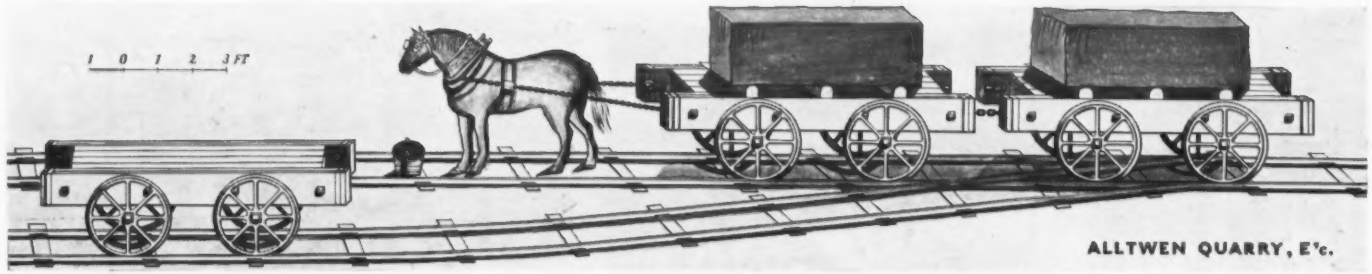
THE German State Railway has recently completed the construction of a new series of wagons for the transport of perishable goods. These wagons can be used either for refrigeration, or they can be warmed by means of radiators connected to the train steam-heating pipe. There are eight Flettner ventilators in the roof which are rotated by the movement of the vehicle and draw in fresh air from the outside. When the wagons are required for refrigeration this air is forced into a conduit which leads to the top of two compartments filled with ice, one at each end of the wagon, by means of which it is cooled and driven into the interior of the wagon. The vehicles, which are of welded steel frame construction and thoroughly insulated with Alfol, are carried on four wheels and weigh 15 tons including some two tons of ice. They have a capacity for 13 tons of goods and are designed to run at a speed of 90 km.p.h. (56 m.p.h.). They are painted white, which, besides repelling heat, makes them readily distinguishable, and the word *Kühlwagen*, prominently painted diagonally across the exterior attracts general attention.

New perishables wagon, German State Railway



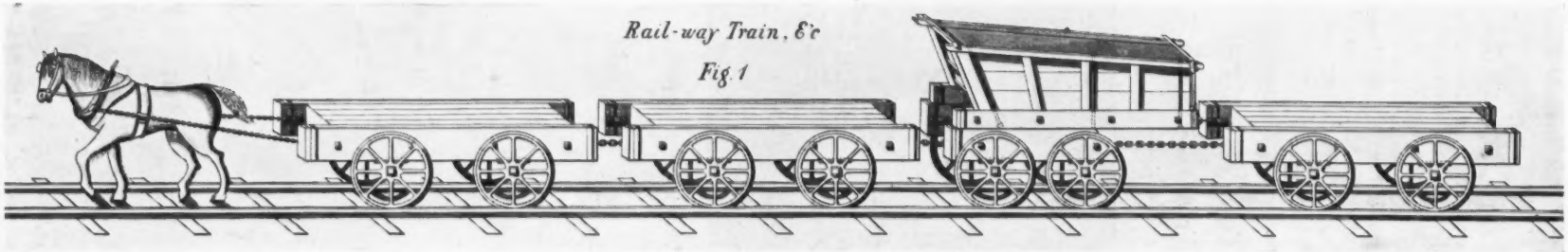
Dimensioned drawings of the new series of Reichsbahn refrigerator wagons for the transport of perishable goods

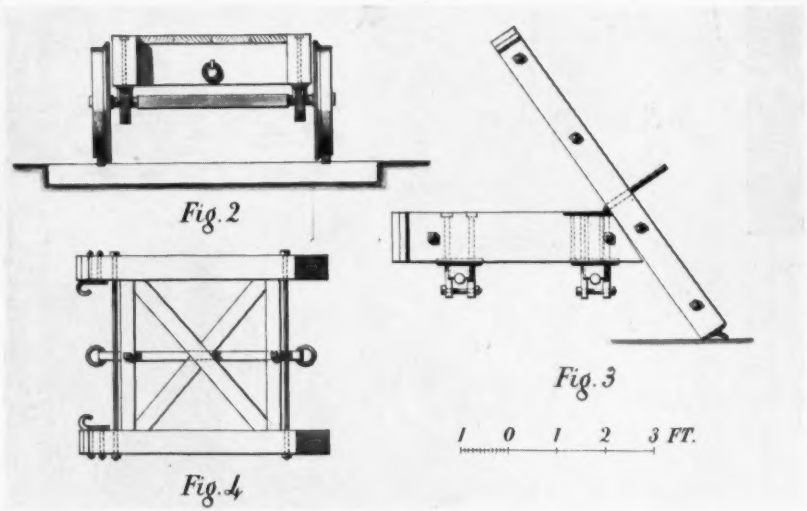
XUM

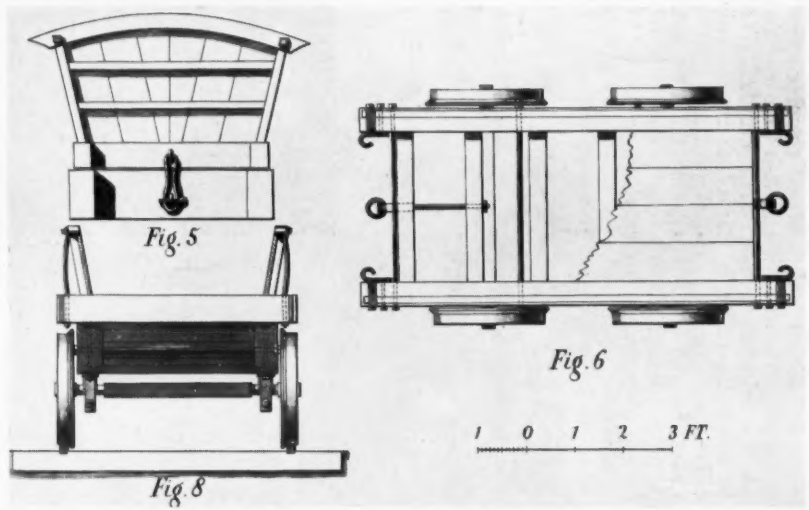


Rail-way Train, E'c

Fig. 1







Facsimiles of sections of two sheets of drawings showing very early mineral railway details. The top view lettered "Alltwen Quarry, E'c," was part of a sheet showing various pieces of quarry apparatus; there are obvious imperfections in the delineation of the permanent way. The figured drawings give a good idea of the vehicle constructional methods of the period, including details of a tip-wagon. It will be noticed that flanged wheels are used and that the gauge scales at 4 ft. 5½ in. The original drawings bear on the back the signature "Wm. Page" and are dated 1801. They came into the possession of the G.W.R. among documents taken over in Wales at the time of grouping, and we are indebted to Mr. Raymond Carpmael, Chief Engineer of the company, for permission to reproduce them

RAILWAY NEWS SECTION

PERSONAL

The Hon. R. J. Manion, P.C., M.D., C.M., L.R.C.P. (Edinburgh), L.R.C.S. (Edinburgh), L.F.P. & S. (Glasgow), Minister of Railways in the last Canadian Conservative Government, has been declared the new leader of the National Conservative Party, in place of Mr. R. B. Bennett.

Major R. D. Walker, Manager and Chief Engineer of the Kowloon-Canton Railway (British Section), who has been visiting this country, is sailing for the United States today (September 2).

The appointments of the following part-time members of the Northern Ireland Road Transport Board, which expired on August 23, have been renewed for a period of one year: Lord Enniskillen, Messrs. J. R. Haslett, S. Haughton, D. W. Smyth, R. H. Smyth, and J. E. Wilson.

We regret to record the sudden death at New Malden, Surrey, on August 13, of Mr. A. E. B. Sullen, O.B.E., formerly of the Indian State Railways. Mr. Sullen was born on June 10, 1878, and joined the State Railways service in June, 1907. In March, 1908, he was appointed Assistant Engineer, North-Western Railway, and became Executive Engineer of that system in March, 1908. In June, 1921, he received the O.B.E. Mr. Sullen became Deputy Chief Engineer, N.W.R., in March, 1927, and from November, 1930, until his retirement in June, 1933, was Officiating Deputy Agent of the Eastern Bengal Railway.

INDIAN RAILWAY STAFF CHANGES

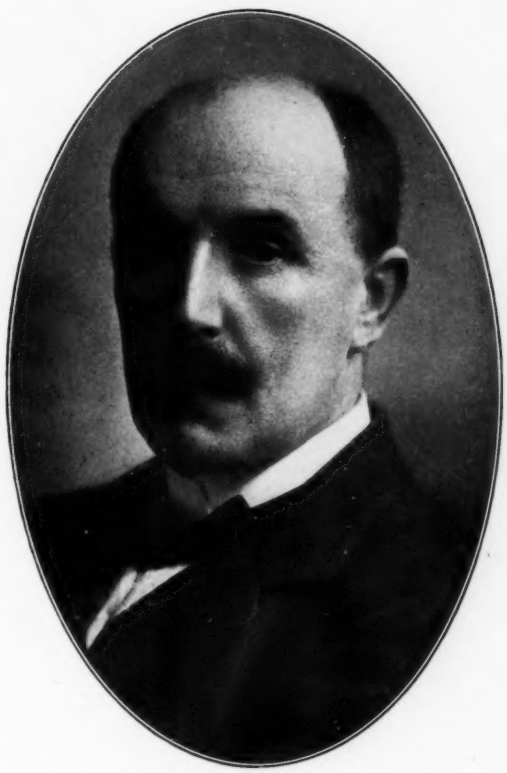
Mr. S. E. L. West, O.B.E., V.D., has been appointed to officiate as Chief Commercial Manager, N.W.R., during the absence on leave of Mr. F. R. Hawkes.

Mr. W. T. Biscoe, V.D., has been appointed to officiate as Divisional Superintendent, Lahore, N.W.R., in place of Mr. West.

Mr. K. V. Iyes, Chief Auditor and Accountant, M. & S.M.R., has been granted leave prior to retirement as from August 17.

Mr. A. E. W. Jervis has been appointed to succeed Mr. Iyes as Chief Auditor and Accountant, M. & S.M.R., as from that date. Mr. W. Jolly is acting as Deputy Chief Auditor and Accountant, *vice* Mr. Jervis.

We regret to record the death on August 28, at the age of 68, of Mr. Alexander Newlands, C.B.E., M.Inst.C.E., who was Chief Civil Engineer of the London Midland & Scottish Railway from 1927 to 1933. Mr. Newlands entered the service of the Highland Railway in 1892, having previously served his apprenticeship with a private firm of civil engineers. In 1893 he was appointed Resident Engineer on the construction of the Kyle of Lochalsh extension of the Dingwall & Skye Railway after previously carrying out the preliminary survey and Parliamentary work connected therewith. This construction entailed some of the heaviest rock cutting in the country and the deepwater steamer pier at Kyle of Lochalsh, and was completed in 1897. Meanwhile he was associated with the promotion of a number of lines in the Highlands, many of which reached the Parliamentary Committee Rooms and were highly contested there by opposing Bills. He also prepared projects for railways in the islands of Skye and Lewis. In 1897, Mr. Newlands was appointed Resident Engineer on the widening of the Blair Atholl—County March section of the main line, and later, onwards to Dalwhinnie. He also supervised the location of the Wick & Lybster and Dornoch Light Railways. In 1899, he was appointed Chief Assistant, and in 1901 Assistant Engineer, finally being promoted Engineer-in-Chief in 1914. With the amalgamation he became Divisional Engineer, Inverness, L.M.S.R., and in 1925 was transferred to the Crewe Division in a similar capacity. He was appointed Chief Civil Engineer of the L.M.S.R. in 1927. His work on the L.M.S.R. included the reorganisation of the Civil Engineering Department, the expenditure of a very large amount of money on schemes associated with the Remission of Government Passenger Duty and Development (Loan Guarantee and Grants) Act, 1929, and the construction of the Mid-Nottingham Joint Railway for the development of the Mid-Nottinghamshire coalfield.



The late Mr. Alexander Newlands, C.B.E.

Formerly Engineer-in-Chief, Highland Railway, and Chief Civil Engineer, L.M.S.R., 1927–33

An interest external to his railway work into which Mr. Newlands threw himself with much zeal was the exploitation of the hydro-electric possibilities of the Highlands, and on this subject he prepared extensive reports and read papers to the British Association, the Royal Society of Arts and other scientific societies, and in the end succeeded in interesting the Government in the possibilities of that part of that country, so that ultimately he was asked to become a member of the Water Power Resources Committee which reported to the Government on the hydro-electric possibilities of Great Britain; it is noteworthy that almost all the schemes of water power development that he advocated have now come into being. He was also a member of the conjoint board of the Royal Society which reported on the hydro-electric possibilities of the British Empire. Mr. Newlands was a member of the Council of the Institution of Civil Engineers, a member of the American Railway Engineering Association, and of the Institution of Water Engineers. He was the author of "A Short History of the Growth and Development of the Scottish Railway Systems," and of "The British Railways," a statistical and financial discussion of modern railway operation, besides being a contributor to our own pages. In 1926 Mr. Newlands was President of the Permanent Way Institution. Mr. Newlands was also a Director of Hurst Nelson & Co. Ltd. The

funeral took place at Glasgow Crematorium on August 30.

Among the representatives of the L.M.S.R., past and present, at the funeral were the following :—

Messrs. Charles Kerr (representing Lord Stamp and the directors), John Ballantyne (Chief Officer for Scotland), T. H. Moffat (also representing Mr. O. Glynne Roberts, Secretary of the company), Capt. J. W. Harris (Marine Manager), Colonel E. C. Trench (formerly Chief Civil Engineer), Messrs. W. Paterson (District Engineer, Inverness), C. Marsden (District Engineer, Irvine), W. H. Melville, A. W. Donaldson, A. H. Edwards, W. Paterson, R. W. Cairns, H. H. Lord.

Mr. James H. Hunter, who, as recorded in our issue of August 5, has been appointed Solicitor and Rating Agent (Scotland), L.N.E.R., as from the end of this month, joined the staff of the Solicitor's Department of the former North British Railway Company in 1903. After passing through various branches, he in 1918 succeeded the late Mr. James McLaren as Assistant in charge of the Conveyancing Department, Mr. McLaren being then appointed Solicitor of the N.B.R. On the appointment of Mr. T. B. Maitland as Solicitor (Scotland) of the L.N.E.R. in 1924, Mr. Hunter became his Chief Assistant, the position he has held until his present appointment in Mr. Maitland's stead.

Mr. James H. Hunter

Appointed Solicitor and Rating Agent (Scotland), London & North Eastern Railway

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Mr. J. M. Greathead, Assoc.M., Inst.C.E., whose appointment as Chief Civil Engineer, South African Railways & Harbours we recorded on August 5, was born in 1885, in South Africa; he took his B.A. degree (Mechanical Sciences Tripos) at Cambridge in 1907. After two years in Leeds with the Airedale Foundry and Leeds Corporation Water Works, he joined the Cape Government Railways in 1910 as Assistant Engineer on construction. The Cape Government Railways were merged in the South African Railways & Harbours in the same year on the establishment of the Union of South Africa. Mr. Greathead continued on railway construction until the outbreak of the war in 1914, when he was one of the staff employed upon the construction of the Prieska-Kalkfontein line, which was hurriedly constructed in order to further the South West African Campaign. On completion of that work he served for three years in the Royal Engineers in France, attaining the rank of Major, commanding 103rd Field Company, Royal Engineers, and receiving the M.C. and mention in despatches. Returning to South Africa in 1919, Mr. Greathead resumed railway work and in 1928 was appointed System Engineer, taking charge of the Natal System. In 1934 he became Inspecting Engineer at Headquarters, and in 1935 Assistant Chief Civil Engineer. He was one of the South African Railways and Harbours delegates to the International Railway Congress in Paris last year.

Mr. J. M. Greathead

Appointed Chief Civil Engineer, South African Railways & Harbours

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We regret to record the death in Edinburgh on August 24, at the age of 68, of Major James H. Gailey, D.S.O. Major Gailey, as a civil engineer and surveyor, was engaged for several years on railway contracts in Brazil, Columbia, and Chile. Later, he took part for seven years in the construction of the Kenya & Uganda Railways. During the war, as a Major in the East African Protectorate Forces, he was concerned with constructional and repair work on the railways of German East Africa.

We regret to record the death on August 24, in a boating accident at Killarney, of Mr. Charles Parker, O.B.E., Assistant (Passenger Services) to the Chief Operating Manager, L.M.S.R. Mr. Parker, who was 60 years of age, entered the service of the former London & North Western Railway at Berkswell in 1895, serving an apprenticeship and holding various clerical positions in the Leamington and Birmingham area until 1913, when he joined the staff of the Superintendent of the Line, Euston. In January, 1922, he was appointed Passenger Trains Assistant, General Superintendent's Office, Euston, and in 1923 and 1925 held similar positions at Manchester and Euston respectively. In November, 1932, Mr. Parker was appointed Assistant (Passenger Services) to the Chief Operating Manager, Euston. Mr. Parker had been associated for a number of years with the Royal Train arrangements, first of all in connection with arrivals and departures at Euston, and latterly with journeys over the L.M.S.R. system as a whole. It was in connection with this work that he received the O.B.E. in 1937.

The late Mr. C. Parker, O.B.E.

Assistant (Passenger Services) to Chief Operating Manager, L.M.S.R., 1932-38

Mr. W. Hovell, Commercial Traffic Superintendent of the Buenos Ayres & Pacific Railway, has arrived in this country on leave of absence.

RAILWAY-ASSOCIATED BUS COMPANIES

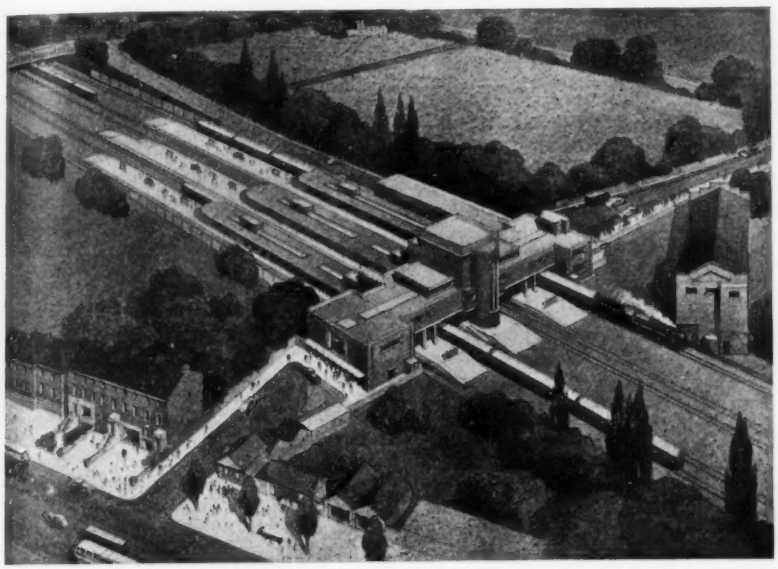
Mr. T. G. Davies, formerly Assistant Traffic Manager of the Western Welsh Omnibus Co. Ltd., has been appointed Traffic Manager of the company in succession to Mr. W. T. James, whose promotion to General Manager was recorded in our issue of August 12.

Mr. R. G. James, General Manager of East Midland Motor Services Limited, has been appointed General Manager of the Devon General Omnibus & Touring Co. Ltd., with Mr. W. H. Geere as Assistant General Manager. Mr. James is succeeded in the general managership of the East Midland Company by Mr. H. G. R. Lambert, formerly Operating Manager of the Southern and Western National Omnibus Companies.

New Station for Harrow-on-the-Hill

L.N.E.R. trains to have separate platform—Two new tracks

We reproduce below an artist's impression of the new Metropolitan and L.N.E.R. station at Harrow-on-the-Hill, which is to be completed by the end of 1939. The general layout of the existing station, with the three platforms, and the approaches from College Road on the north and Lowlands Road on the south, will remain. The outer platforms, which at present serve only one track, will be made to serve two, by the addition of one track on the Lowlands side for L.N.E.R. trains and another on the College Road side for Metropolitan Line trains. The two tracks on the south side—there is a steam train seen on the furthermost one in the picture—will be used by the L.N.E.R., which will then have the monopoly of the south platform; and the remaining four tracks will be used by Metropolitan Line Electric trains.



Artist's impression of the new Harrow-on-the-Hill station

Approach to the north entrance will be from the forecourt leading off College Road, as it is today. In the centre of the façade will be a large window 15 ft. by 12 ft. with the familiar Underground " bullseye " sign, and a concrete canopy stretching along almost the entire width of the entrance hall as can be seen in the drawing. This window will be floodlit from the inside at night, a scheme similar to that successfully adopted at the Queen Street entrance to Hammersmith station. On each side of the station entrance there will be a shop facing the forecourt. At the top of two short flights of steps will be the new ticket hall, 57 ft. long and bridging all three platforms.

At the top of the steps on the left will be a tea room and on the right a buffet. Next to the tea room will be a line of eight telephone booths. At intervals on the left of the ticket hall, which will have the usual London Transport terra-cotta finishings, relieved by coloured tiled bands, will be three staircases leading to the two Metropolitan Line platforms and the L.N.E.R. platform. In the centre of the right hand wall will be the ticket office where both Metropolitan and L.N.E.R. tickets will be issued. On each side of the ticket office there will be two small shops. From the far end of the ticket hall two short flights of steps will lead down to the Lowlands Road entrance. Here, there will be cloakrooms on each side. The façade on this side of the station will be similar to that on the other except that on either side of the entrance, bracketed to the wall, will be a lamp standard and three layers of flower boxes, one above the other. In place of shops there will be a cycle store and a parcels office. The large central window will be a square—14 ft. by 14 ft.—with the " bullseye " sign and the concrete canopy.

Signal Box in Tower

The centre piece of the new station will be the tower, which rises 60 ft. from the middle platform. The base of this, as has been explained, is the centre of the ticket hall, containing the ticket office. At the top of the tower there will be a signal cabin and telephone exchange. The semi-circular front facing west will contain the spiral staircase leading to the signal cabin. The tall window, 30 ft. high, which lights the staircase will contain 264 glass lenses, each an inch thick, be set in bronze channels in pre-cast concrete mullions. The process of making this window will be similar to that used for stained glass windows.

The 500-ft. L.N.E.R. platform and the two 440-ft. Metropolitan platforms will not be altered, but new roofs similar to those at Earls Court and South Ealing will be erected on all three. Skylights will run down the centre, and the small rectangular blocks which can be seen projecting through the roofs at the east end enclose the machinery of the lifts, which will bring parcels to the surface from a subway running under the tracks at that point.

The building on the extreme right of the picture is the London Transport sub-station, which will be enlarged by 40 ft. at the northern end to accommodate the additional equipment necessary for the improved working of the line. In common with the board's practice for new and reconstructed " out-of-town " stations, this new building will be finished in the usual warm-toned brown brick, relieved by white concrete, designed to harmonise with other buildings in the district.

Great Southern Railways Conciliation Grade Employees

Owing to the existing circumstances on the Great Southern Railways, notice was given that it was intended to place the conciliation grade employees on a day-to-day basis for working. The notice was as follows :—

" Due to largely increased costs of railway and road transport working coupled with reduced traffics, expenditure has, for some time past, exceeded receipts, and the company may find it necessary as a precautionary measure to give notice to all its staff terminating their services, but on the expiration of such notice continuing their employment on a day-to-day basis as may be required. The company regrets that such action appears necessary, but the staff may be assured that the maximum number possible will be retained commensurate with the company's ability to provide salaries, wages and essential materials. —By order of the Board."

The announcement apparently caused consternation among the staff and the result of various meetings led to a conference between the railway representatives and the representatives of the men's unions. A frank discussion took place on the company's present financial position and on the company's proposal to issue notices to the entire staff. At the urgent request of the trades unions, the conference was adjourned to enable the representatives of the unions to make immediate approach to the Government with a view to finding an alternative method of dealing with the present situation. Pending the result of the conference between the Government and the trades unions, the company agreed to postpone the notices.

XUM

RAILWAY LAW FOR THE QUARTER

The Long Vacation

The Courts rose as usual at the end of July and will not re-open until October 12. There has been for many years an agitation to shorten the Long Vacation, but this would make little difference to the arrears that have accumulated. Parliament has taken the right course in deciding to appoint a third Court of Appeal whose Judges should also be available from time to time for the ordinary King's Bench Work. Laymen are often surprised at the amount of judicial time taken up by undefended divorce cases, even if they admire the celerity of the Judge who has to deal with them, and one may well think that some lesser luminaries might hear these cases both in London and on circuit.

The problem of the courts is really a difficult one as the number of cases varies largely according to the state of general trade. Thus in one year in the King's Bench Division there may be enough to keep ten Judges busy, while in the following year there is only enough for five—and one cannot remunerate the Judges on piecework! The result is that a compromise must be struck, with a happy mean between paucity and abundance.

Common Employment

Radcliffe v. *Ribble Motor Services* (1938) 2 *K.B.* 345.

The old doctrine of common employment is less important since the Workmen's Compensation Act has enabled a workman to recover for injuries suffered in the course of his employment in all cases, save where the injury is due to his own wilful misconduct. The principle was that where two men were servants of a common master and engaged in the same common work the one could not recover damages arising from the other's negligence. Thus in 1850 in *Hutchinson* v. *York, Newcastle & Berwick Railway*, a railway servant travelling in a train on duty was killed through the negligence of other servants in charge of the train and his representatives failed to recover under the Fatal Accidents Act owing to this rule of "common employment." Recently, in *Radcliffe* v. *Ribble Motor Services*, R., a motor-coach driver in the defendants' employ died from injuries received through being crushed by another coach driven by J., who was in the same employment. It was found that the accident was due to J's negligence, but the defendants pleaded common employment. This was held to be a good defence because both R. and J. were in the same employment at the time of the accident, under one master and engaged in the common work of driving a party of excursionists from Liverpool to New Brighton. It was argued on the other side that the drivers were engaged on independent journeys and so did not share a common risk. But this did not prevail in the Court of Appeal, and so far as ordinary claims for damages for negligence are concerned this time honoured defence is as much alive as ever.

Railways and Road Repair

The construction of railways in the last century continually required roads to be carried over the railway by means of bridges, and provision was made for this by the Railways Clauses Consolidation Act 1845, S. 46. The roads had to be executed "and at all times thereafter maintained at the expense of the company." The question often arose as to the extent of this liability and in *Attorney General* v. *Great Northern Railway Company* (1916) 2 A.C., 356, it was held that the company was liable to maintain the bridge in as sound a condition as at the date of completion. It must be sufficient to bear the traffic as at the date of completion, but not according to the standard of present day traffic. In *Swain* v. *Southern Railway Company* last term, Mr. Justice Humphreys had before him the case of a cyclist who was thrown from his machine and injured owing to a deep rut in the road leading down from one of the defendant's railway bridges in Somerset. He sued the company for damages, and the question was raised whether the company was in the position of a surveyor of highways, who is liable only for negligent repair, that is, "misfeasance," and not for failure to repair, or "nonfeasance." This exemption extends to municipal bodies who took over the duties of the surveyor of highways. But does it extend to railway companies?

Liability for Non-Repair

In *Swain's* case, Mr. Justice Humphreys said that it was too late now to argue that railway companies were entitled to the benefit of this exemption. The Courts indeed are not anxious to extend the doctrine at all. But apart from this there are many cases where it has been held that failure to perform a statutory duty renders the company liable to pay damages for non-repair. [See for instance *Blundy Clark & Co.* v. *London & North Eastern Railway Company* (1931) 2 K.B. 334.] There is a great difference between the liability of a public authority to repair a highway and the duty to maintain a bridge which is put upon a railway company as a condition of allowing it to interfere with an existing road. The cyclist therefore in *Swain's* case was awarded £1,590 damages by Mr. Justice Humphreys.

Before leaving this point it should be observed that the liability of a railway company is limited. It is liable to maintain the bridge and its approaches only in the state in which these were when constructed. The road surface must be level and free from ruts, so as not to be a danger to the traffic of the kind which existed when the bridge was built. Beyond that the company need not go, and it need not adapt the road to the needs of modern traffic.

Public Authorities Protection

One other point was raised in *Swain's* case which is of interest. The Public Authorities Protection Act, 1893, enacts that against such bodies an action must be begun within six months of the negligence complained of, or not at all. But can it be said that a railway company is a public authority for this purpose? In the absence of authority Mr. Justice Humphreys refused to hold that the statute applied. He said that in order to succeed, the defendants must show not only that they were acting under statutory powers, but that they were performing a public duty as a public authority. Presumably the fact that they were engaged in transporting for profit prevented them from being classed as a public authority. Mr. Justice Humphreys gave a considered judgment, and as all these points were discussed it will be read with much interest.

Road Transport Comments

The Bouts Tillotson Case in (1936) 25 Tr. Cas. 158 makes it clear that it is no part of the duty of a licensing authority to pay regard to a difference between road and rail rates in considering applications for an "A" licence. If objectors proved that existing transport facilities are sufficient, the application will be refused and the reason is that a grant would not be in the public interest. In the Annual Report of the Licensing Authorities (Road and Rail Traffic Act, 1933) the Yorkshire Commissioner expresses the view that objectors cannot limit his discretion to determining the tonnage necessary in order to carry upon trunk services those goods for which rail service is not suitable. He regards it as his duty to take into consideration the whole circumstances of the case and the objections, and he claims to be limited only by the decision of the Appeal Tribunal and by that part of the Act (S. 6, sub-s. 2) which compels him to regard the interests of the public generally.

The commissioners say that they find it easy to determine applications for "C" licences, that is, for traders who wish to carry their own goods. But the "A" and "B" licences present more difficulties. The commissioners have complaints to make against the road services, which are worthy of attention. The Midland Commissioner finds that road vehicles continually travel at excessive speed, disregarding the legal limit; that the records are badly kept and often deliberately falsified; and finally that the upkeep of the vehicles is neg-

lected. The East Midland Commissioner found in one case a haulier who had three live lions in his trailer! The trailer had no brakes but only sham brake connections fitted between trailer and tractor.

The report contains a good deal about applications for the continuation of licences where a business is taken over from a deceased trader or one who is going out of business. These are made under S. 11, sub-s. 3 (*b*) of the Act of 1933. As to this, reference has been made previously in these columns to *Woodward's* case (1938) 1 Ch. 303, in which the matter was not so simple as first appeared, and a public enquiry was ordered before the application was granted. The report gives one the impression that the licensing system is not generally liked. In order to avoid applying for a licence, trailers are sometimes attached to private cars, and goods or livestock are carried in this way rather than by regular goods vehicles. But the system is the best solution which has yet been devised of a difficult problem, and there we must leave it.

Completion of Trans-Iranian Railway

Trains can now run throughout the 865 miles of this great new railway from Bandar Shah on the Caspian Sea, *via* Teheran to Bandar Shahpur on the Persian Gulf

In our issue of July 22 last we described the further progress that had then been made in the construction of this great 865-mile line across Iran from north to south, and referred to the earlier issues of July 26, 1935, and June 11, 1937, in which descriptions of the work involved had appeared.

On Friday last, August 26, the Shah officially completed the last section of the line, that to the south of Teheran, with due ceremony and in the presence of a distinguished company. On Saturday the first through train from the Persian Gulf steamed into Teheran. As the first train from the Caspian Sea reached the capital several months ago, the ceremonial arrival on Saturday inaugurated the opening of the whole line from Bandar Shah to Bandar Shahpur.

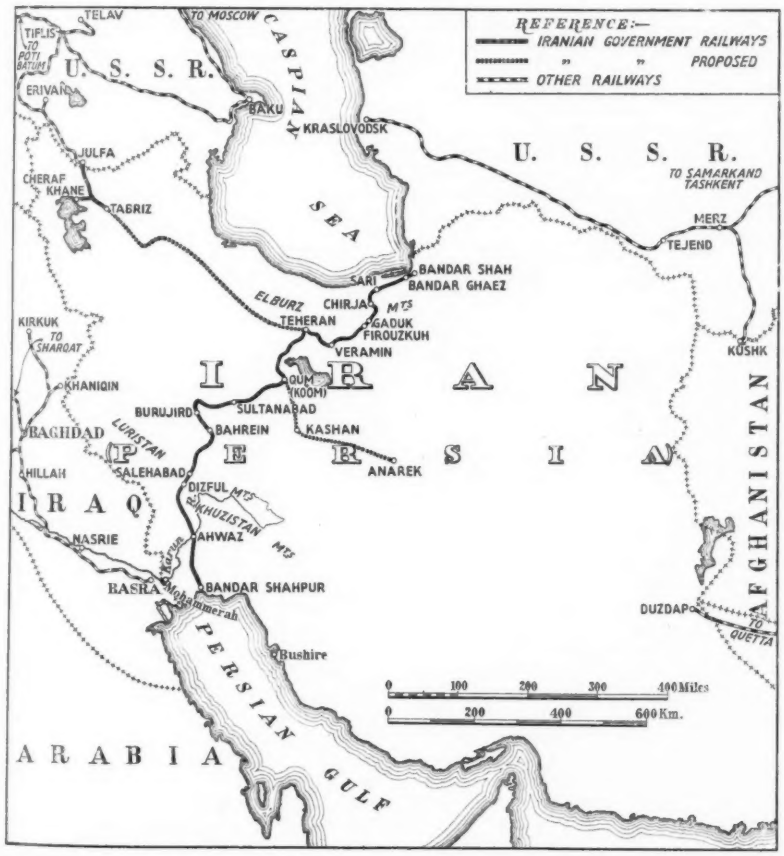
The total cost is now placed at about £28,000,000, and it may be remembered that this great undertaking has been financed by the resources of Iran. It is only natural, therefore, that the completion of the permanent way throughout should be celebrated with great enthusiasm and justifiable pride in this ambitious financial enterprise.

The engineering work, much of which has been very heavy and difficult, has been carried out by foreign contractors, the heaviest sections under or in association with the Danish Kampsax Consortium. In our issue of July 22 last we detailed the very important share of the work allotted to the British firm, Richard Costain Limited, London, whose contract is said to amount to about £1,000,000. Its importance lies mainly in the extremely difficult engineering problems involved, and this firm's completed section was handed over to the Iranian Government in February last.

It may be reiterated that for the long 1 in 30 gradients very powerful Garratt locomotives were ordered from Beyer Peacock & Co. Ltd., Manchester, and are successfully carrying out their arduous duties. Other 2-8-0 locomotives for the more easily graded sections were also obtained from this firm, and in this connection reference is made to our issues of October 5, 1934, and July 26, 1935. Among the various firms that have built goods stock for this line is the Metropolitan-Cammell Carriage & Wagon Co. Ltd., and some of the bridge steelwork is also British.

The construction has been in hand for about seven years in all, and the earlier work was largely in the hands of American firms. The constructional concerns more recently associated with Kampsax Consortium, the consulting and generally directing engineers, are British, French, German, Italian, and Belgian, and the rails are reported to be of Russian manufacture, so that the work has been well distributed.

The undertaking is the first major step towards the consummation of Reza Shah Pahlevi's grandiose life-scheme for westernising his country. It is expected that the construction of the Teheran—Tabriz railway will next be undertaken and this may form the first link in a great west to east chain of railway communications across Iran, eventually, perhaps, connecting with the Indian railway system at Duzdap, on the temporarily closed extension beyond Nok Kundi from Quetta.



Sketch map showing the alignment of the Trans-Iranian Railway. The proposed branch lines shown were referred to on page 260 of our issue of August 5 last, as being likely to be undertaken in the near future

STATE PURCHASE OF TRANSANDINE RAILWAY SANCTIONED.—A Reuters message from Buenos Aires states that the Argentine Chamber of Deputies has approved the State purchase of the Argentine Transandine Railway.

XUM

NOTES AND NEWS

French Main-Line Electrification.—The conversion work on the 215-mile St. Pierre des Corps—Bordeaux main line of the ex-P.O.-Midi Railway is now two-thirds completed, and electrically-hauled trains are running between St. Pierre, Poitiers, and Angoulême. It is expected that conversion to the 1,500-volt d.c. system of the Angoulême-Bordeaux division will be finished before Christmas.

Collision on New York Subway.—A collision at 116th Street station of the New York Subway on August 22 resulted in two persons being killed and 49 injured. A train was just leaving the station when it was pulled up suddenly on account of a passenger's hand being trapped in one of the sliding doors. Another train collided with it in the rear, telescoping the last coach.

Named Trains to Celebrate L.M.S.R. Centenary.—The L.M.S.R. announces that in connection with the centenary of the throughout opening of the London & Birmingham Railway (which is being celebrated by a special exhibition at Euston station from September 19-25), the 9.15 a.m. Euston-Birmingham express and the 4.50 p.m. Birmingham-Euston express will be permanently named "Centenary." During the week of centenary celebrations, special souvenir menu cards will be used on restaurant car expresses between London and Birmingham.

Special Two-Day Fare to Empire Exhibition.—A special two-day third class fare of 53s. 10d. from London to Glasgow is to be introduced on Friday nights during September by the L.M.S.R. and L.N.E.R. for the benefit of passengers visiting the Empire Exhibition and wishing to spend an extra day in Scotland. The fares will apply only on specified services leaving Euston and King's Cross respectively at 9.15 p.m. and 10.25 p.m. on Fridays, returning from Glasgow on Sunday nights at 10.30 p.m. and 10 p.m. for Euston and King's Cross. Sleeping berths will be available in each direction.

The "Lion" Locomotive and the L.M.S.R. Centenary.—The old locomotive *Lion* built in 1838 for the Liverpool & Manchester Railway, and now normally exhibited at Liverpool Lime Street station, L.M.S.R., has been put in running order at Crewe ready to take part in the London & Birmingham Railway centenary celebrations at Euston. It will be sent to Euston in company with the ex-L.N.W.R. single-driver locomotive *Cornwall*. The exhibition will be held from September 19-25 inclusive and will be open to the public at the following times: Monday, 12 noon to 3 p.m.; Tuesday to Friday, 10.0 a.m. to 3 p.m.; Saturday, 10.0 a.m. to 8.30 p.m.; Sunday, 10.0 a.m. to 5 p.m. The admission fee of 6d. (children 3d.) will include a souvenir booklet. Other exhibits to be shown will be the Furness Railway engine *Coppernob*; L.N.W.R. 4-4-0, *Coronation*; and a standard L.M.S.R. streamlined Pacific. Rolling stock exhibits will comprise full-size models of Liverpool & Manchester coaches, royal saloons of Queen Adelaide and Queen Victoria, two coaches and a kitchen car of the Coronation Scot, a first class sleeping car, first and third class corridor coaches, and an articulated three-car diesel unit.

G.W.R. Loud-Speakers.—The loud-speaker installations at Paddington, Birmingham (Snow Hill), Cardiff, and Newport stations have proved so successful in directing passengers to trains during holiday and other rush periods that the Great Western Railway proposes to instal similar equipment at Torquay. A second portable loud-speaker unit will also be in use at stations where large football or racing crowds are expected.

Ceylon Government Railway.—On our Official Notices page will be found a notice by the Crown Agents for the Colonies, asking for applications for the post of General Manager of the Ceylon Government Railway. Candidates must be British subjects, and must have held important administrative or executive positions on a railway. They must have up-to-date experience of modern railway problems and of road and railway competition, and must be capable of handling difficult problems of policy and of organisation. They should preferably be members or associate members of the Institution of Civil Engineers, the Institution of Mechanical Engineers, and/or the Institute of Transport.

Best-Kept Stations in the N.E. Area of the L.N.E.R.—In the 1938 competition awards have been made as follows. Special class prizes of £6 to Egton, Hessle, and Newham; first class prizes of £4 to Bainton, Baldersby, Beverley, Brancepeth, Burton Agnes, Carnaby, Cockfield Fell, Dinsdale, Driffield, Finghall Lane, Glaisdale, Goldsborough, Heddon-on-Wall, Hunwick, Lartington, Leyburn, Longhirst, Longhoughton, Low Fell, North Grimston, Poole-in-Wharfedale, Sawdon, Settrington, Sherburn Colliery, Shildon, South Gosforth, Sprouston, Thornaby, Thornton Dale, Tow Law, Velvet Hall, Wetwang, Wharram, Winston, Witton Gilbert, Witton-le-Wear. Second class prizes of £3 have been awarded to 48 stations; third class prizes of £2 to 65; and fourth class £1 prizes to 86 stations.

Anglo-Scottish Railways Assessment.—The Anglo-Scottish Railways Assessment Authority in its report for the year ended March 31, 1938, states that the net receipts for the years 1930–34 (which form the basis of the cumulo valuations of the two Anglo-Scottish railway companies for the quinquennial periods commencing in England at April 1, 1936, and in Scotland at Whitsunday, 1938, were duly certified in the course of the year under review, at the figures given in THE RAILWAY GAZETTE of August 20, 1937, at page 329. As a preliminary to ascertaining the average net receipts for the five accounting years 1935–39, which will form the basis of the cumulo valuations of the two Anglo-Scottish companies operating from April, 1941 (England) and Whitsunday, 1943 (Scotland), it has been arranged for a test investigation to be carried out for 1937.

Canadian Pacific Earnings.—Gross earnings of the Canadian Pacific Railway for the month of July, 1938, amounted to $11,090,000, a decrease of $952,000 in comparison with July, 1937. Working expenses were $10,583,000, or $364,000 lower, leaving net earnings $588,000 lower at $507,000. Aggregate gross earnings for the first seven months of 1938 were $72,378,000, a decrease of $6,454,000, and the net earnings of $3,188,000 for the same period showed a fall of $6,168,000 in comparison with the first seven months of 1937.

Canadian National Earnings.—The July, 1938, gross earnings of the Canadian National Railways were $14,176,717, a decrease of $2,486,268 compared with July, 1937. Operating expenses amounted to $14,273,676, with a decrease of $1,430,410, resulting in a deficit of $95,959, against net earnings of $958,899 for July, 1937. Aggregate gross earnings for the first seven months of 1938 amounted to $96,936,276, a decrease of $14,723,023, and there was a deficit for the seven months of $5,776,941, as compared with net earnings of $7,626,847 for the first seven months of 1937.

G.W.R. Special Trains for Hop-Pickers.—The Great Western Railway will run between 40 and 50 special trains in connection with the Midland hop-picking season which opens early in September and lasts for about ten days. The trains will convey over 15,000 hop-pickers from the mining districts of South Wales and from the Birmingham and Wolverhampton area to the extensive fields in Herefordshire and Worcestershire. The Herefordshire acreage of hops is the second largest in England, and over a third of the country's crop is grown on the G.W.R. system.

Northern Ireland Transport Inquiry.—It is reported in Belfast that the M'Lintock Committee which inquired into the operation of the Road and Rail Transport Act in Northern Ireland, will recommend the Northern Government to introduce further legislation governing the carrying of goods by road, designed specially to meet the position created by the provision in the Act permitting firms to carry their own goods by road, which, according to statements made at the public inquiry, had been used by transport operators bought out by the Transport Board to continue as carriers by becoming nominal partners in firms whose goods they then transport by road. Another recommendation, it is stated, may be

the amalgamation of two of the railway undertakings operating in Northern Ireland. No confirmation of this, however, can be obtained, and it was stated that the report of the M'Lintock Committee had not yet been presented to the Government and was not likely to be completed for some time. The members of the committee are Sir William M'Lintock, Bt. (Chairman), Sir Herbert Walker, and Mr. J. S. Nicholl.

Lectures on Railway Subjects.—The London School of Economics and Political Science has issued its syllabus for 1938-39 of lectures and classes on railway and cognate subjects. London University offers two degrees for students specialising in inland transport, namely, B.Sc. (Econ.), with Honours in Transport and International Trade, and B.Com. with Honours in Trade and Transport. Seven courses of lectures have been specially arranged for railway students, and nine other of the general economic lecture courses are recommended for their attention by the Advisory Committee of Governors on Railway Subjects. Particulars are given in the syllabus of lecture courses recognised for those participating in the L.N.E.R. education scheme, and of the conditions of competition for the Brunel silver medal.

Alteration of East Prussian Station Names.—The names of a number of stations in East Prussia have been altered. Among the more important changes are:—

Former Name	New Name
Eydtkuhnen	Eydtkau
Gr. Rominten	Hardteck (Ostpr.)
Nikolaiken (Westpr.)	Niklaskirchen
Rudczanny	Niedersee
Stallipönen	Ebenrode

Forthcoming Events

Sept. 8 (*Thurs.*)—Railway Club, at Royal Scottish Corporation Hall, Fetter Lane, London, E.C.4, 7.30 p.m. "The Early History of the North Staffordshire Railway," by Mr. J. Simmons.

Sept. 15-24.—Model Engineer Exhibition, at Royal Horticultural Hall, Vincent Square, London, S.W.1.

Sept. 19-23.—International Management Congress, at Washington, U.S.A.

International Rail Assembly, at Düsseldorf, Germany.

British and Irish Traffic Returns

GREAT BRITAIN	Totals for 34th Week			Totals to Date		
	1938	1937	Inc. or Dec.	1938	1937	Inc. or Dec.
	£	£	£	£	£	£
L.M.S.R. (6,834¾ mls.)						
Passenger-train traffic...	604,000	613,000	– 9,000	18,130,000	18,133,000	– 3,000
Merchandise, &c. ...	406,000	495,000	– 89,000	15,279,000	16,538,000	–1,259,000
Coal and coke ...	231,000	250,000	– 19,000	8,414,000	8,630,000	– 216,000
Goods-train traffic ...	637,000	745,000	– 108,000	23,693,000	25,168,000	–1,475,000
Total receipts	1,241,000	1,358,000	– 117,000	41,823,000	43,301,000	–1,478,000
L.N.E.R. (6,315 mls.)						
Passenger-train traffic...	418,000	417,000	+ 1,000	11,740,000	11,841,000	– 101,000
Merchandise, &c. ...	283,000	321,000	– 38,000	10,651,000	11,379,000	– 728,000
Coal and coke ...	196,000	245,000	– 49,000	7,960,000	8,335,000	– 375,000
Goods-train traffic ...	479,000	566,000	– 87,000	18,611,000	19,714,000	–1,103,000
Total receipts	897,000	983,000	– 86,000	30,351,000	31,555,000	–1,204,000
G.W.R. (3,737 mls.)						
Passenger-train traffic...	269,000	281,000	– 12,000	7,627,000	7,711,000	– 84,000
Merchandise, &c. ...	172,000	212,000	– 40,000	6,244,000	6,694,000	– 450,000
Coal and coke ...	107,000	116,000	– 9,000	3,626,000	3,772,000	– 146,000
Goods-train traffic ...	279,000	328,000	– 49,000	9,870,000	10,466,000	– 596,000
Total receipts	548,000	609,000	– 61,000	17,497,000	18,177,000	– 680,000
S.R. (2,148 mls.)						
Passenger-train traffic...	401,000	401,000	—	11,374,000	11,440,000	– 66,000
Merchandise, &c. ...	60,000	67,000	– 7,000	2,033,500	2,115,500	– 82,000
Coal and coke ...	32,000	31,000	+ 1,000	1,013,500	1,032,500	– 19,000
Goods-train traffic ...	92,000	98,000	– 6,000	3,047,000	3,148,000	– 101,000
Total receipts	493,000	499,000	– 6,000	14,421,000	14,588,000	– 167,000
Liverpool Overhead ... (6½ mls.)	1,427	1,338	+ 89	47,087	44,446	+ 2,641
Mersey (4½ mls.) ...	3,989	3,869	+ 120	148,025	141,871	+ 6,154
*London Passenger Transport Board ...	548,900	546,000	+ 2,900	5,032,400	4,995,700	+ 36,700
IRELAND						
Belfast & C.D. pass. (80 mls.)	3,450	3,667	– 217	89,723	93,184	– 3,461
,, ,, goods	442	404	+ 38	14,547	16,516	– 1,969
,, ,, total	3,892	4,071	– 179	104,270	109,700	– 5,430
Great Northern pass. (543 mls.)	15,150	14,600	+ 550	377,100	381,850	– 4,750
,, ,, goods	9,300	9,250	+ 50	298,900	320,350	– 21,450
,, ,, total	24,450	23,850	+ 600	676,000	702,200	– 26,200
Great Southern pass. (2,076 mls.)	50,093	52,767	– 2,674	1,255,003	1,254,404	+ 599
,, ,, goods	42,255	39,280	+ 2,975	1,317,873	1,370,977	– 53,104
,, ,, total	92,348	92,047	+ 301	2,572,876	2,625,381	– 52,505

* 9th Week (before pooling)

British and Irish Railway Stocks and Shares

Stocks	Highest 1937	Lowest 1937	Prices Aug. 31, 1938	Prices Rise/Fall
G.W.R.				
Cons. Ord. ...	67⅜	55¾	33	–1
5% Con. Prefce. ...	127	108	93½	–1
5% Red. Pref. (1950)	113	109	99½	—
4% Deb.	113⅝	102½	106	—
4½% Deb.... ...	118	106	108½	—
4½% Deb.	124½	112	113½	—
5% Deb.	136½	122¾	126½	—
2½% Deb.... ...	76	64	66½	—
5% Rt. Charge ...	133 7/16	118	119½	—
5% Cons. Guar. ...	133¾	116½	108½	+2
L.M.S.R.				
Ord.	36⅛	25⅜	13	–¼
4% Prefce. (1923)	82½	65¾	28½	+1
4% Prefce. ...	92½	77¾	52½	+1
5% Red. Pre 1955)	107¾	102	74½	—
4% Deb.	108	99¼	100½	—
5% Red. Deb. (1952)	117½	111	112½	—
4% Guar. ...	104	95⅞	89½	+4
L.N.E.R.				
5% Pref. Ord. ...	12½	6¾	4	–¼
Def. Ord.	6¼	3⅝	2½	–⅛
4% First Prefce.	79½	63	26½	+1
4% Second Prefce.	31½	21	10½	—
5% Red. Pref. (1955)	101¼	89¾	49½	—
4% First Guar. ...	103	91⅞	78½	+1
4% Second Guar.	97⅝	85½	59½	—
3% Deb.	84⅛	74	72½	+½
4% Deb.	107¼	98½	96½	—
5% Red. Deb. (1947)	113½	106½	108½	—
4½% Sinking Fund Red. Deb.	110 5/16	105½	107	—
SOUTHERN				
Pref. Ord.... ...	98⅝	83½	50½	—
Def. Ord.	27⅞	16¾	12	–½
5% Pref.	126 11/16	105 13/16	93½	—
5% Red. Pref. (1964)	118	110¼	102½	—
5% Guar. Prefce.	133¾	116¾	109½	—
5% Red. Guar. Pref. (1957)	118½	111½	111½	—
4% Deb.	112	101¼	105	—
5% Deb.	135¾	123½	126½	—
4% Red. Deb. 1962–67	113	105	106½	—
BELFAST & C.D.				
Ord.	5	4	4	—
FORTH BRIDGE				
4% Deb.	106	99½	100½	—
4% Guar. ...	105¾	99	99½	—
G. NORTHERN (IRELAND)				
Ord.	11	5	2½	–1
G. SOUTHERN (IRELAND)				
Ord.	50	21½	20	—
Prefce.	61	34	13	—
Guar.	94¾	69½	34	–1
Deb.	95	82⅛	65	–5
L.P.T.B.				
4½% "A" ...	123¾	110½	118½	—
5% "A" ...	135	121½	128½	—
4½% "T.F.A." ...	108¾	104	106	—
5% "B" ...	125	114½	119½	—
"C"	99¾	75	74	+½
MERSEY				
Ord.	42⅜	22	20	—
4% Perp. Deb. ...	103	96¾	99	—
3% Perp. Deb. ...	77⅝	74½	73½	—
3% Perp. Prefce.	68¾	61¼	62½	–2½

Safer Transport of Goods by Rail

Demonstrations of improved packing and stowage by French National Railways

Safe transport of goods by rail is viewed as a question of prime importance in maintaining railway revenues by the French railway authorities, who are taking measures to enlist the co-operation of the general public, as well as railwaymen, in order to eliminate risks of damage in transit. Increased competition by road carriers, undertaking door-to-door delivery to all parts of France, renders it essential to give the best possible service to attract and retain the regular transport trade of manufacturers and retailers and to win the confidence of the public. Losses due to compensation claims for damage in transit must be cut down to a minimum. The National Railways Company (S.N.C.F.) is conducting a campaign to reduce breakages, and for this purpose has organised a department known as "Prevention des Avaries aux Marchandises" (Prevention of Damage to Merchandise), with its central office at the St. Lazare station, Paris, and is under the charge of M. Valentin Thomas, Inspecteur Principal adjoint.

In 1937 the railways organised exhibits at the industrial fairs in Paris, Marseilles and Nice, as well as at the St. Lazare station, with the object of demonstrating the best methods of packing goods and of stowage in railway vans and wagons to reduce risks of breakage. These exhibitions were appreciated and supported by traders and industrialists; makers of packing material and containers also gave effective practical aid by sending samples of their products.

This year under the auspices of the S.N.C.F. several stands were arranged at the Paris Fair to stress the advantages of good packing, careful handling, and safe stowage in vans and trucks, and results of numerous experiments in packing and safe transit were shown to the public. In one instance a case containing a refrigerator had been carried nearly a thousand miles and handled 29 times without the slightest damage. Another example was a cooking stove, which had been dispatched to Marseilles, Nice, and other towns on the Riviera and returned to Paris intact. Ordinary methods of packing often failed to give satisfactory results.

Reducing Risks from Shocks

Carriage of pleasure boats, including small yachts and motor craft, has hitherto involved considerable risk, especially during the holiday rush of the summer season. This risk has been virtually eliminated now by placing the boat on a *ber*, a kind of portable cradle designed by M. Bruneau, of the S.N.C.F. goods services. How shocks may cause the breakage of fragile articles in transit was shown by some amusing experiments with apparatus illustrating what neglect of the laws of gravity, inertia, and conservation of energy may mean to parcels. Hence it was indicated that packages should be stowed in the van on a broad base lengthwise in the direction of the train's movement to prevent possible toppling over.

But even placed flat on the floor, the package might shift under the effect of the van's motion or sudden stoppage. A case with sharp edges might then strike any projection in uneven flooring and fragile contents be broken. To avoid such shocks, the S.N.C.F. recommends that cases should have rounded corners and edges to slide like skis over any unevenness in the floor. Another means of dissipating shocks is by using cushions in the form of mats made of special long straw and similar protective means. Old pneumatic tyres make very good shock absorbers when stuffed with straw mats, but the straws must be long and strong and not apt to break up into chaff and dust.

Packing Materials on View

Methods of stowing goods in vans and trucks were illustrated by a model goods train running on a toy track. M. Thomas told the writer that he found this attracted crowds of children whose parents then became interested. He and his assistants were kept busy all day at the stands giving advice on packing materials and methods. Florists were taught to tie the stems of flowers to the baskets so that they cannot shift, and all kinds of cardboard packing cases were on view. One contained a space for small block of "dry ice" (solid carbon dioxide) and thus acted as a refrigerator. Other materials shown comprised Kraft paper bags, packing fibres, cords, chains, metal strips for binding packages, cases with "ski" edges, plywood, transparent paper, and strips of wood for packing bricks and tiles to prevent shifting and breaking. Chains are used to prevent barrels of cider, wines and oils from rotating.

M. Thomas explained that flexible stowage was preferred to rigid, as the latter system was more liable to risk of breakages from shocks. A model showing the system of compartment packing in wagons used on British railways was on view, and there were also exhibits by the Association of American Railroads. At the present time, M. Thomas is busy organising the exhibition train mentioned in THE RAILWAY GAZETTE of August 5, which is to begin a tour of France in September, stopping at 300 towns, to illustrate methods of packing, stowing, and handling of goods, as recommended by the S.N.C.F.

RAILWAY AND OTHER REPORTS

Easton & Church Hope Railway Company.—The $3\frac{1}{10}$ miles railway of this company which is situated in the Isle of Portland and is connected with the Weymouth & Portland Railway by a short Admiralty line, is worked by the Great Western and Southern Railway Companies jointly under an arrangement of 1897. Gross receipts in the year 1937 were £3,644, against £3,568 in 1936, and expenditure was reduced from £4,297 to £4,158, leaving a loss on railway working of £514, compared with £729. Miscellaneous receipts of £70 reduce the net loss to £444. This, added to rentals and the debit of £132,071 brought in, makes the debit balance forward £135,616.

Ottoman Railway Holding Co. Ltd.—The report for the year ended June 30, 1938, which has now been issued, amplifies the preliminary statement published on August 12 at page 311. Total income was £64,176, which included £56,118 from the holding of Turkish bonds, against a total income of £46,454 for the previous year (including £39,822 from Turkish bonds). Net profit, after providing for income tax and N.D.C., was £41,334, against £30,395, and with the £2,543 brought forward there is a sum of £43,877 available for interest on, and redemption of, the "A" and "B" income debenture stocks. These stocks receive interest at the maximum rate of 3 per cent., less tax, requiring £33,590, and the balance of £10,287 is to be applied towards their redemption *pari passu*. For the previous year $2\frac{1}{2}$ per cent. was paid, leaving £2,543 to be carried forward. As an outcome of the recent Anglo-Turkish financial agreement, the Turkish Government is now meeting in full in sterling the service on the £707,950 of $7\frac{1}{2}$ per cent. Turkish bonds, 1935, which formed the consideration for the purchase of the Ottoman Railway (Smyrna to Aidin). Hitherto 50 per cent. only of the value of coupons has been paid in sterling, and the balance was satisfied in Turksih currency which was subsequently converted into francs.

Ransome & Marles Bearing Co. Ltd.—A preliminary statement shows that net profits for the year ended June 30, 1938, after meeting all charges (including an increase of £12,050 in the amount provided for taxation) amounted to £153,528, against £166,351 for 1936–37. The dividend for the year is maintained at 20 per cent., payable on a capital increased from £500,000 to £700,000 because of last year's capital bonus of 25 per cent., and also a small issue of shares on bonus terms.

OFFICIAL NOTICES

Crown Agents for the Colonies

COLONIAL GOVERNMENT APPOINTMENTS.

APPLICATIONS from qualified candidates are invited for the following post:—

GENERAL MANAGER

required for the Ceylon Government Railway. Headquarters of Railway—Colombo.

Route Mileage	951
Train Mileage	4,253,227
No. of Steam Locomotives	280
No. of Steam Rail Cars	33
No. of Coaching Vehicles	900
No. of Goods Vehicles	2,750
Personnel	15,600

2.—The Administration of the Railway is in the general charge of a Minister and Executive Committee of elected members of the State Council.

3.—Candidates must be British subjects, and must have held important administrative or executive positions on a Railway. They must have up-to-date experience of modern railway problems, and of road and railway competition, and must be capable of handling difficult problems of policy and of organisation. They should preferably be members or Associate Members of the Institution of Civil Engineers, the Institution of Mechanical Engineers and/or the Institute of Transport.

4.—The appointment may be made on pensionable terms, and, if so, the salary will not exceed £3,000 per annum and will depend upon the qualifications of the person selected. Local Income Tax is payable on the total income from whatever source it is obtained.

5.—In the case of a suitable applicant being prepared to accept the appointment on agreement for a fixed term of years with no prospect of permanency or pension, a higher salary may be paid according to his qualifications.

6.—Substance allowance will be paid when absent from Colombo on duty in accordance with the Financial Regulations of the Ceylon Government.

7.—Government quarters are provided if available, rent being charged on the basis of a percentage of salary. Present rate 6 per cent. If Government quarters are not available, a rent allowance is paid in accordance with regulations. The rent allowance applicable to this appointment at present is Rs. 150/- per mensem (if married) or Rs. 75/- per mensem (if unmarried).

8.—A free outward passage to Ceylon by Bibby Line steamer or its equivalent by any other British Steamship Line will be provided for the officer selected and for members of his family (including unmarried dependent daughters but not sons over 18 years of age), not exceeding five full passages in all. Leave out of the Island and free passages will be allowed in accordance with the Government Regulations on the subject. The present regulations allow leave out of the Island and free passages after each four-year period of resident service.

9.—Apply at once by letter, stating age, whether married or single, and full particulars of qualifications and experience and mentioning this paper, to the Crown Agents for the Colonies, 4, Millbank, London, S.W.1, quoting M/4001. An applicant desirous of being appointed on the conditions mentioned in paragraph 5 should state what salary he expects and for what period he is prepared to serve.

THE Proprietors of British Patent No. 348,512, for "Improvements in and relating to Electrical Signalling Systems for Railways," desire to enter into arrangements, by way of licence or otherwise, for the purpose of exploiting the same and ensuring its full development and practical working in this country. For particulars, apply: RADCLYFFES, 65, Victoria Street, London, S.W.1.

CARRIAGE AND WAGON DESIGNER DRAUGHTSMAN required by large rolling stock works in India. A single man, about 30 years of age, preferred, who has had extensive drawing office and practical works experience in a rolling stock works of repute. Five years' agreement, free passages, provident fund, and a salary of about £45 per month.—Apply by letter, with copies of testimonials, stating age, and whether married, to "Solebar," c/o MESSRS. WM. ABBOTT, LTD., 32, Eastcheap, London, E.C.3.

THE Proprietor of British Patents Nos. 406,064 and 403,256, both entitled "Improvements in and relating to Railway Track Ballast Tamping Machines," and No. 424,549, entitled "Improvements in or relating to Railway Track Ballast Tamping Machines," desires to arrange for the commercial working of these patents by sale outright or by licences granted on participating and reasonable terms. Particulars obtainable from TECHNICAL RECORDS LIMITED, 59-60, Lincoln's Inn Fields, London, W.C.2.

CONTRACTS AND TENDERS

Large G.W.R. Diesel Railcar Order

The Associated Equipment Co. Ltd. has received an order from the G.W.R. for the design of 20 diesel railcars and the supply and fitting of the requisite power units and gearboxes. The construction of the bogies, underframes, and bodies, and the fitting of automatic train control apparatus will be carried out at the G.W.R. works at Swindon. As explained in our *Diesel Traction Supplement* to this issue, the cars will be generally similar to G.W.R. railcar No. 18, employed on the Lambourn Valley branch, and which can haul another vehicle or do light shunting work. Four railcars, semi-permanently coupled in pairs for the Cardiff-Birmingham express service, will probably have buffet and lavatory equipment; fifteen will be designed to haul trailing loads of 60 tons for branch line work, and the remaining vehicle will be equipped solely for parcels traffic.

Tank Wagons for India

The Gaekwar's Baroda State Railway Administration has placed orders to the inspection of Messrs. Rendel, Palmer & Tritton for a total of 51 four-wheeled tank wagons for metre gauge service as follow:—

S.A. des Ateliers de Construction de Familleureux: 20 petrol tank wagons, 21 ft. 6 in. long over headstocks, with 3,200-gall. capacity welded tank, 17 ft. 6 in. long inside × 6 ft. 7 in. dia. inside, and complete with vacuum brake gear and wheels and axles.

Hurst, Nelson & Co. Ltd.: 31 oil tank wagons, 21 ft. 6 in. long over headstocks, with 2,500-gall. capacity welded tank, 17 ft. 6 in. long inside × 5 ft. 7 in. dia. inside, and complete with vacuum brake gear and wheels and axles.

D. Wickham & Co. Ltd. has received an order from Robert Hudson & Co. Ltd. for two petrol-driven inspection trolleys for service at Rangoon.

Tunnelling Contract, London Passenger Transport Board

Edmund Nuttall, Sons & Co. Ltd. has received the contract from the London Passenger Transport Board for the last remaining section of tube tunnelling, between Gants Hill and Newbury Park, a distance of 1¼ miles, on the eastern extension of the Central Line. This contract, of a value of £380,000, is the fifth to be placed for tunnelling work on this extension, making the total cost of this part of the work £2,250,000. It is hoped that the extension of the Central Line train service from Liverpool Street to Newbury Park will be in operation by December, 1940. A preliminary opening of the service as far as Loughton via Leytonstone will take place in April, 1940.

The Egyptian State Railways Administration has recently placed the following orders:—

La Brugeoise & Nicaise & Delcuve S.A.: Axleboxes (Order No. 21.839, total price, £412 10s., delivery f.o.b. Antwerp).

Klockner & Co.: Carriage and wagon tyres (Ref. No. E.S.R. 321.G.8/21–5, total price £1,904, delivery free Gabbary Quay).

Shell Co. of Egypt Ltd.: Light lubricating oil (Ref. No. E.S.R. 359.G.3/2–15, delivery Gabbary Quay).

The Gloucester Railway Carriage & Wagon Co. Ltd. has received an order from the Sudan Railways for 14 carriage underframes.

The Bombay, Baroda & Central India Railway Administration has placed the following orders for vacuum brake equipment to be supplied to the inspection of Messrs. Rendel, Palmer & Tritton:—

Vacuum Brake Co. Ltd.: Vacuum brake and intercommunication fittings.

Saxby & Farmer (India) Limited: Vacuum brake fittings, including 37 cylinders.

Indian Rubber Manufacturing Co. Ltd.: 8,065 indiarubber hosepipes.

The Chief Controller of Stores, Indian Stores Department (Engineering Section), Simla, invites tenders, receivable by September 28 for the supply of two portable radial and swivel arm drilling machines and one electrically-driven centreless grinding machine.

The Chief Controller of Stores, Indian Stores Department (Engineering Section), invites tenders, receivable by September 21 for a total of 432,000 mild steel bearing plates required for the Controller of Stores, North-Western Railway, Lahore.

Tenders are invited by the Chief Controller of Stores, Indian Stores Department (Electrical Section), Simla, receivable by September 15, for the supply of two single-operator arc-welding sets and one two-operator arc-welding set complete with accessories required for the G.I.P. Railway.

Tenders are also invited by the Chief Controller of Stores, Indian Stores Department (Electrical Section), Simla, receivable by September 22, for the supply of four single-operator arc-welding sets required for the North-Western Railway.

XUM

Railway Share Market

All sections of the Stock Exchange have again been overshadowed by the obscure international outlook. On Monday it appeared that heavy selling pressure might develop, but later the general trend became steadier on the view that there is likely to be a gradual easing of tension in European political affairs. The volume of business remained extremely small, and consequently the tendency has been for prices of individual stocks to be marked down sharply on only a moderate amount of selling.

In the circumstances, it is hardly surprising that Home railway securities have not held the steadier undertone which seemed to be developing towards the end of last week. The traffic figures were again depressing, and various debentures as well as guaranteed and preference stocks have made lower prices. It is generally believed that at around current levels they more than discount the adverse factors in the position and outlook, and that they are likely to improve readily in price when surrounding market conditions are more normal. Great Western 4 per cent. debentures made the rather lower price of 105¼, while L.M.S.R. 4 per cent. debentures were 100½. L.N.E.R. 3 per cent. debentures were 72 and the 4 per cent. debentures 96. The somewhat lower prices are partly a reflection of the trend in British Government securities and other front rank investment stocks, but the debentures offer quite attractive yields when compared with other stocks which carry first class investment merits. Among the guaranteed stocks Great Western 5 per cents were 108, Southern 5 per cents 111, and L.M.S.R. 4 per cents 89, all of which give generous yields. Moreover, the decline in prices must be considered to arise largely from the uncertain trend of market conditions. Southern 5 per cent. preference at 94, and Great Western 5 per cent. preference, which are also quoted at the latter price, appear to be under valued and can reasonably be expected to improve several points when markets are more active, assuming that traffic receipts develop a less depressing trend.

L.M.S.R. 1923 preference at 28, the 4 per cent. first preference at 52 and the ordinary stock at 13 were affected by the large decline in the past week's receipts, as were L.N.E.R. first preference at 26½ and the second preference at 10¼, while Southern preferred declined to 50 and the deferred stock to 11⅞. Great Western ordinary moved down to 33. The disposition is to assume that the directors of the latter railway will be prepared to make a withdrawal from reserves in order to pay a small dividend on the ordinary stock. London Transport "C" at 74½ was again relatively firm on the belief that a dividend of 5½ per cent. will be paid. Argentine railway securities were dominated by the trend of markets, and American railway stocks fluctuated sharply this week.

Traffic Table of Overseas and Foreign Railways Publishing Weekly Returns

	Railways	Miles open 1937-38	Week Ending	Traffics for Week: Total this year	Traffics for Week: Inc. or Dec. compared with 1937	No. of Weeks	Aggregate Traffics to Date: Totals: This Year	Aggregate Traffics to Date: Totals: Last Year	Aggregate Traffics to Date: Increase or Decrease	Shares or Stock	Prices: Highest 1937	Prices: Lowest 1937	Prices: Aug. 31, 1938	Prices: Yield (See Note)
				£	£		£	£	£					
South & Central America	Antofagasta (Chili) & Bolivia	834	28.8.38	13,900	— 4,740	35	528,500	567,850	— 39,350	Ord. Stk.	29	10¼	11	Nil
	Argentine North Eastern	753	27.8.38	12,221	+ 924	9	97,134	89,604	+ 7,530	„	18¼	6	6	Nil
	Argentine Transandine	—	—	—	—	—	—	—	—	A. Deb.	93⅛	60	80	5
	Bolivar	174	July, 1938	3,650	— 2,150	30	26,250	40,800	— 14,550	6 p.c. Deb. Bonds.	9½	5	8½	Nil
	Brazil	—	—	—	—	—	—	—	—	Ord. Stk.	17	9	6	85/16
	Buenos Ayres & Pacific	2,806	27.8.38	71,030	— 7,816	9	609,183	687,345	— 78,162	Ord. Stk.	17⅛	5½	5	Nil
	Buenos Ayres Central	190	13.8.38	$120,000	— $39,300	7	$762,800	$1,010,600	— $247,800	Mt. Deb.	41½	18	14	Nil
	Buenos Ayres Gt. Southern	5,084	27.8.38	124,442	+ 124	9	1,039,393	1,024,380	+ 15,013	Ord. Stk.	33¾	13½	11½	Nil
	Buenos Ayres Western	1,930	27.8.38	36,228	— 13,524	9	313,584	396,713	— 83,129	„	31¾	11¼	8½	Nil
	Central Argentine	3,700	27.8.38	106,545	— 23,439	9	867,985	1,195,429	— 327,444	„	34¼	10¾	9	Nil
	Do.	—	—	—	—	—	—	—	—	Dfd.	20½	4½	4½	Nil
	Cent. Uruguay of M. Video	972	20.8.38	15,988	+ 1,124	8	122,320	113,788	+ 8,532	Ord. Stk.	67/32	2	2	Nil
	Cordoba Central	1,218	—	—	—	—	—	—	—	Ord. Inc.	6¼	1½	3½	Nil
	Costa Rica	188	June, 1938	31,369	+ 318	52	314,399	249,333	+ 65,066	Stk.	38	27	25½	715/16
	Dorada	70	July, 1938	18,900	+ 3,800	31	114,600	105,500	+ 9,100	1 Mt. Db.	107	106	105	511/16
	Entre Rios	810	27.8.38	16,700	+ 1,638	9	133,020	122,778	+ 10,242	Ord. Stk.	19⅞/16	6	5½	Nil
	Great Western of Brazil	1,092	27.8.38	5,200	— 1,200	35	221,800	250,400	— 28,600	Ord. Sh.	5/4	1/8	1/4	Nil
	International of Cl. Amer.	794	June, 1938	$425,611	+ $9,637	26	$3,010,489	$3,126,388	— $115,899	—	—	—	—	—
	Interoceanic of Mexico	—	—	—	—	—	—	—	—	1st Pref.	2/-	1/-	1/2	Nil
	La Guaira & Caracas	22¾	July, 1938	5,345	+ 930	31	35,580	38,120	— 2,540	Stk.	8½	6	8½	Nil
	Leopoldina	1,918	27.8.38	26,549	— 475	35	669,073	792,014	— 122,941	Ord. Stk.	9¼	3	2	Nil
	Mexican	483	21.8.38	$247,400	— $54,900	8	$1,955,000	$2,181,500	— $226,500	„	1½	1/4	5/16	Nil
	Midland of Uruguay	319	July, 1938	8,682	+ 1,041	4	8,682	7,641	+ 1,041	„	17/8	1/2	1/2	Nil
	Nitrate	386	15.8.38	5,852	+ 230	33	96,357	100,988	— 4,631	Ord. Sh.	31/16	2	2	5
	Paraguay Central	274	20.8.38	$2 832,000	— $808,000	8	$24,370,000	$26,892,000	— $2,522,000	Pr. Li. Stk.	84	79¼	57½	55/16
	Peruvian Corporation	1,059	July, 1938	74,055	— 7,079	5	74,055	81,134	— 7,079	Pref.	14⅝	4½	3	Nil
	Salvador	100	20.8.38	¢14,610	+ ¢4,473	8	¢93,993	¢93,629	+ ¢364	Pr. Li. Db.	23½	21½	22½	Nil
	San Paulo	153½	21.8.38	32,504	— 1,381	34	1,055,956	1,102,652	— 46,696	Ord. Stk.	98½	56	34½	119/16
	Taltal	160	July, 1938	3,510	+ 570	4	3,510	2,940	+ 570	Ord. Sh.	17/16	11/16	5/4	135/16
	United of Havana	1,353	27.8.38	16,727	— 911	9	136,054	160,756	— 24,702	Ord. Stk.	55/8	51/32	1½	Nil
	Uruguay Northern	73	July, 1938	874	+ 86	4	874	788	+ 86	Deb. Stk.	10	2	2	Nil
Canada	Canadian National	23,754	21.8.38	674,078	— 59,535	34	21,357,058	24,484,093	— 3,127,035	—	—	—	—	—
	Canadian Northern	—	—	—	—	—	—	—	— 4 p.c.	Perp. Dbs.	77	62½	63½	65/16
	Grand Trunk	—	—	—	—	—	—	—	—	4 p.c. Gar.	101⅞	94½	101½	315/16
	Canadian Pacific	17,186	21.8.38	523,400	+ 11,000	34	16,001,600	17,311,000	— 1,309,400	Ord. Stk.	18	7¼	6½	Nil
India†	Assam Bengal	1,329	10.8.38	36,322	+ 3,256	19	492,212	466,422	+ 25,790	Ord. Stk.	86	73½	79	313/16
	Barsi Light	202	10.8.38	2,295	+ 38	19	57,352	52,155	+ 5,197	Ord. Sh.	66½	46	60	85/16
	Bengal & North Western	2,116	10.8.38	61,327	— 9,390	19	1,065,640	1,132,729	— 67,089	Ord. Stk.	317	301	286½	65/16
	Bengal Dooars & Extension	161	10.8.38	4,078	— 299	19	47,908	47,749	+ 159	„	100	84	85½	7
	Bengal-Nagpur	3,268	10.8.38	148,875	— 3,433	19	2,515,338	2,563,297	— 47,959	„	101	89	92	45/8
	Bombay, Baroda & Cl. India	3,085	20.8.38	182,625	— 17,475	20	3,390,075	3,476,025	— 85,950	„	113	110½	110½	57/16
	Madras & Southern Mahratta	2,967	10.8.38	132,300	+ 10,928	19	2,092,498	1,987,558	+ 104,940	„	110	105	106	8½
	Rohilkund & Kumaon	546	10.8.38	11,446	+ 621	19	214,243	217,148	— 2,905	„	314	302	296½	61/16
	South Indian	2,531½	10.8.38	108,172	+ 994	19	1,521,135	1,507,051	+ 14,083	„	103½	99½	101½	411/16
Various	Beira-Umtali	204	June, 1938	89,780	— 1,725	40	783,061	676,896	+ 106,165	—	—	—	—	—
	Egyptian Delta	620	10.8.38	5,926	— 281	19	72,475	77,139	— 4,664	Prf. Sh.	31/-	5/4	5/4	Nil
	Kenya & Uganda	1,625	July, 1938	179,918	— 19,221	31	1,678,207	1,723,478	— 45,271	—	—	—	—	—
	Manila	—	—	—	—	—	—	—	—	B. Deb	48⅛	43½	43	8½
	Midland of W. Australia	277	June, 1938	15,962	+ 4,994	52	180,120	155,207	+ 24,913	Inc. Deb.	98	93½	91½	45/8
	Nigerian	1,900	16.7.38	33,052	+ 6,527	16	476,905	817,125	— 340,220	—	—	—	—	—
	Rhodesia	2,442	June, 1938	425,403	+ 5,522	40	3,743,259	3,352,058	+ 391,201	—	—	—	—	—
	South Africa	13,263	13.8.38	624,225	— 40,352	20	11,858,821	12,128,430	— 269,609	—	—	—	—	—
	Victoria	4,774	May, 1938	849,379	+ 26,441	48	9,015,865	9,342,068	— 326,203	—	—	—	—	—

NOTE.—Yields are based on the approximate current prices and are within a fraction of 1/16

† Receipts are calculated @ 1s. 6d. to the rupee § ex dividend.

The variation in Sterling value of the Argentine paper peso has lately been so great that the method of converting the Sterling weekly receipts at the par rate of exchange has proved misleading, the amount being overestimated. The statements are based on the current rates of exchange and not on the par value

Diesel Railway Traction

Economical Working by Railcars

FEW indications of the abilities of railcars to reduce operating expenses and bring more traffic are to be found in the British Isles, for with three exceptions in Ireland no railway has tried railcars on a basis that could give anything but a comparatively or definitely unsatisfactory result. Under that sound railwayman Henry Forbes, the County Donegal Railways—cradle of diesel railcar operation in the British Isles—has for the past six or seven years shown what could be done on the long, straggling type of railway where traffic is relatively infrequent, subject to fluctuations, and under the stress of road competition. The Irish railway figures for the year 1937 show that despite the difficulties associated with its topography and with the nature of its traffic, the County Donegal Railways had a lower operating ratio than any other system, a result which must be attributed in a large measure to the low working costs and traffic-building propensities of the small railcars, which work practically all of the passenger traffic. The diesel cars cost no more than 4d. a mile, including everything, to operate in stop-anywhere service, and figures not greatly dissimilar are obtained with the 100 b.h.p. railcars on the Great Northern Railway of Ireland. The 18 railcars of the Great Western Railway are spread over too wide an area on the company's system to be operated to the best advantage, but they were specifically intended for supplementary services, and not for the replacement of steam trains. Nevertheless, in at least one instance they help to bear out the French contention that the introduction of railcars invariably brings an increase of 25 to 150 per cent. in traffic, for it is no uncommon thing on Monday mornings for a steam train to replace the railcar on the Birmingham—Cardiff buffet service on account of the popularity which this working has gained during the last four years. The diesel cars at work on the Great Western Railway have now covered an aggregate of about 2½ million miles.

Great Western Diesel Cars

AT the annual meeting of the Great Western Railway Company in February last, Viscount Horne announced that, as a result of the success of the 18 diesel cars now owned by the company it was proposed to place an order for a further 20 units. Hitherto the A.E.C., of Southall, has supplied the underframes, bogies, brake gear and coach work, together with the power units, but we understand it has now been decided that, while this firm will design the cars and supply and fit the power units, gearboxes, &c., the construction of the bogies, underframes, bodies and the fitting of automatic train control apparatus will be carried out in the Great Western works at Swindon. The design of the new cars will be generally similar to that of the car (No. 18) used on the Lambourn Valley branch, which is capable of hauling an additional coach or horse box, or of performing light shunting, but a number of improvements and modifications are being incorporated to secure smoother and more efficient running. The cars will be fitted with twin engines and all the controls will be of the electro-pneumatic type so that two or more cars can be coupled together and operated as one unit when desired. Of the 20 new vehicles, four will be semi-permanently coupled in pairs as twin-car units to replace the individual cars on the fast Cardiff—Birmingham service, which during their four years of operation have developed the traffic beyond the capacity of a single car. These cars will have a maximum speed of 70 m.p.h., will accommodate 108 passengers, and probably have lavatory accommodation and buffets. Fifteen of the new cars are to replace steam trains on branch lines or on subsidiary services on main lines, and will be geared for a maximum speed of 40 m.p.h. They will be capable of hauling a load of 60 tons in addition to their own weight, representing two standard 60-ft. coaches, or several horseboxes or similar vehicles. Two of these cars will, however, be specially fitted with dual-range gearboxes giving alternative speeds of 40 and 60 m.p.h. The remaining car is intended solely for parcels traffic and will be used to supplement the existing parcels railcar which has been operating successfully in the London area for the last two years. The cars are expected to be delivered during the early part of next year.

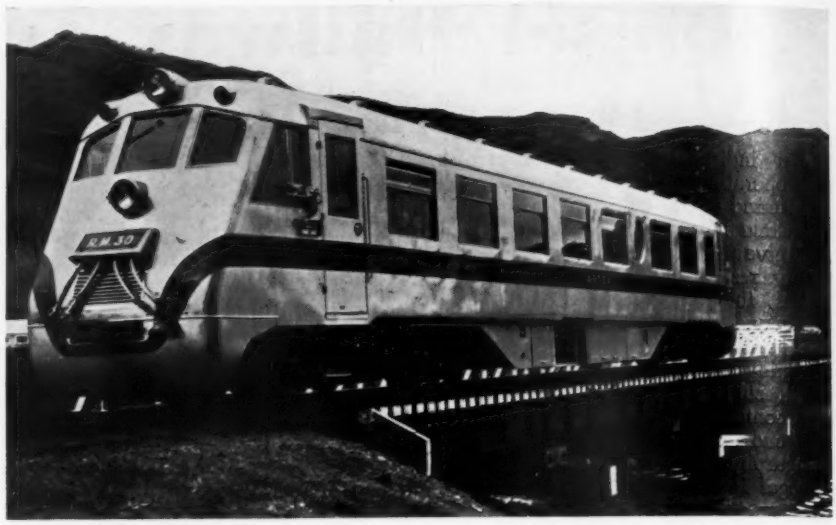
Supercharging for Altitude

THE manifold advantages of supercharging for diesel railway traction applications have been noted several times in this Supplement, but the results of a particular manifestation of its powers—that of compensating for the effect of altitude—is described in some detail elsewhere in this issue. Supercharging of both oil and petrol engines in aircraft is quite common, and it is usual practice for the supercharger in these applications (sometimes exhaust gas and sometimes mechanically-driven) to be capable of maintaining the normal unsupercharged sea-level output at all heights up to about 10,000 ft. But the effects of a 50 per cent. greater altitude have to be compensated on the Peruvian Central Railway, which rises to a height of 15,800 ft. The engine being used on the rebuilt railcar described on another page has a normal unsupercharged output of 150 b.h.p. at 1,500 r.p.m. at sea-level; the reduction in output owing to the increasing rarity of the atmosphere with increasing height amounts to approximately 3 per cent. per 1,000 ft., so that at 15,800 ft. the power developed by this engine would be only 78 to 80 b.h.p., and this—minus the power required for auxiliaries—is not sufficient to propel even a light car up the sinuous 1 in 25 grades by which the summit is approached. Therefore a Büchi exhaust-gas turbo supercharger was fitted, and permits of an output of 120 b.h.p. being maintained at 15,000 ft., that is, a reduction of only 20 per cent. on the sea-level figure, or an increase of 45 per cent. above what is possible with an unsupercharged engine. At sea-level the supercharged unit can develop a normal output of 200 b.h.p. with a fuel consumption of only 159 gr. per b.h.p. and with a blower pressure of 4 lb. per sq. in., whereas the full load fuel consumption of the ordinary engine is 173 gr. per b.h.p.hr. There is no reason why this moderate blower pressure should not be exceeded if more complete altitude compensation is desired, and tests with a Büchi-supercharged Junkers aeroplane engine, already a highly-rated unit, showed that the normal sea-level output could be maintained up to nearly 20,000 ft.

XUM

Main-Line Diesel-Hydraulic Railcars for New Zealand

240-b.h.p. double-engined vehicles of modern design for solo operation on 3ft. 6in. gauge tare 27 tons and have a fully-laden weight of 33 tons



The first of the new double-engined diesel-hydraulic railcars, named "Aotea"

A FURTHER important addition to the railcar stock of the New Zealand Government Railways has been made by the completion at the Hutt Valley workshops, Wellington, of six double-bogie vehicles intended for main line service, at the moment principally on North Island between Wellington, Palmerston and New Plymouth, and between Wellington, Napier and Wairoa, 270 miles. These new cars bring the New Zealand total up to 15; the existing six petrol and three diesel six- and four-wheeled cars operating between Christchurch and Greymouth (South Island) and between Wellington and Palmerston North (North Island) were illustrated and described in the issue of this Supplement for May 14, 1937.

Motive Power

As with the small cars, the new double-bogie vehicles are powered by Leyland engines and have Leyland (Lysholm-Smith) hydraulic transmission, one engine-transmission set being mounted on each bogie. The engine has six 4⅝ in. by 6 in. cylinders with a piston displacement volume of 9·9 litres. Its maximum capacity is 130 b.h.p. at 2,000 r.p.m., but in these examples the governor is set to give 120 b.h.p. at 1,900 r.p.m. as a maximum. C.A.V.-Bosch injection equipment is incorporated. The throttle control is of the Westinghouse pneumatic type embodying patent self-lapping valves. At each end of the engine is a rigid welded pressed steel carrier transmitting the engine and hydraulic torque converter weight to substantial welded steel cross transoms through four double rubber mounting blocks.

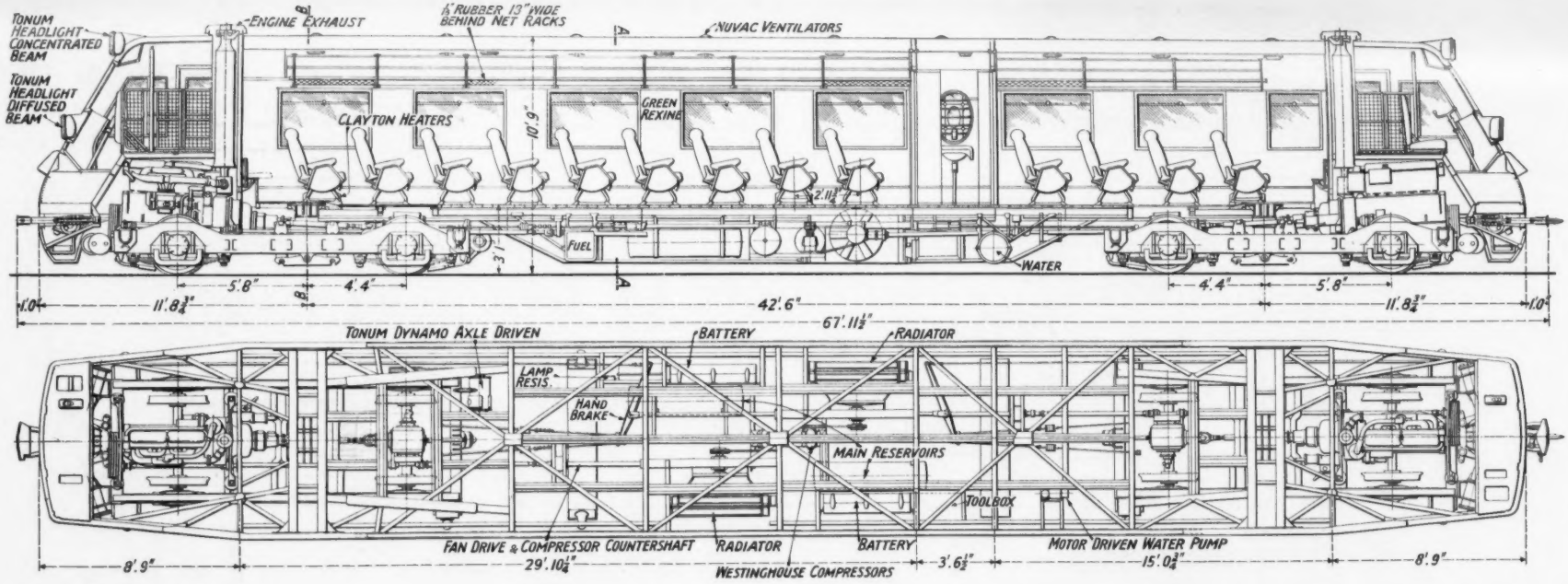
The radiators for the engine cooling water and for the paraffin used in the torque converter are located beneath the car floor at about the mid-length, and the drive for the fan is taken by a quadruple belt from a pulley on the front of the engine crankshaft and thence by 26 ft. of cardan shafts with six flexible couplings. From the fan shaft a Texrope drive leads to the Westinghouse E13 air brake compressor. This arrangement and drive refers to both engines; indeed, apart from the single 65-gal. fuel tank and one 50-gal. water-tank, which are common to both plants, each engine, torque converter, radiator and other details form a complete motive power unit, which can be operated singly or in conjunction with its fellow from either driving position, or from the other car when two are being operated in multiple-unit. The engine exhaust gases are led straight up to the roof through a vertical silencer.

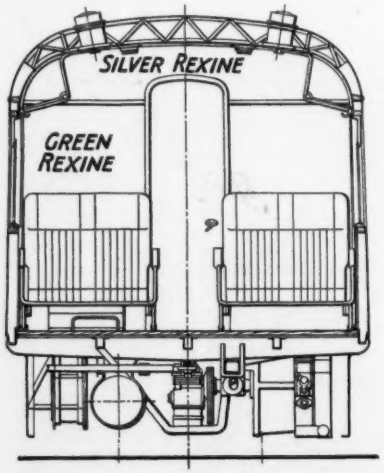
From the torque converter, which is bolted to the engine crankcase, and which has a paraffin filter and heat exchanger mounted on the outside of the bogie frame, the drive is taken through a cardan shaft with two universal joints to the reversing bevels and spur gear drive on the axle, passing over the bogie pivot on the way. Only the inner axle of each bogie is driven, and the ratio of the drive is 2·28:1; the torque reaction is taken to the inner transom through a short cylindrical member having a spherical end with rubber cushioning blocks. To the side of the axle drive casing are attached a couple of brackets carrying intermediate bearings for the radiator fan drive. The engine, torque converter and drive are set on the bogie at an inclination of 1 in 20, with the vertical centre of the engine 7 in. in front of the leading axle and with the centre of the primary shaft of the axle drive 9⅝ in. above the axle.

Mechanical Portion

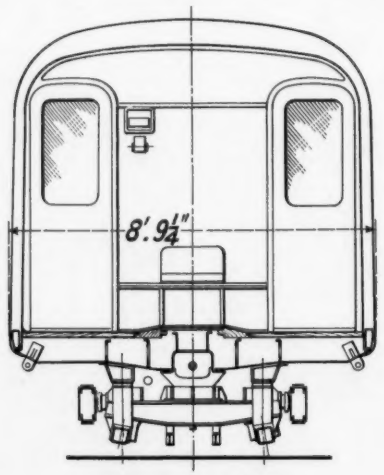
The considerable experience which has been obtained at the Hutt Valley workshops in the use of welding for locomotive and rolling stock construction has been turned to good account in the fabrication of the bogies and framing of these new railcars. Moreover, especially considering the difficulties of building a car of this size and power for the 3 ft. 6 in. gauge, the mechanical design is excellent, as instanced by the strong and well braced box frames of the bogies, the box-shaped outer sole bars, and the extremely stiff diagonal bracing of the body side frames and floor.

The bogie wheelbase is 10 ft., but the Timken tapered roller bearing pivot, supported on a rubber block which also cushions the end and side thrusts, is situated 5 ft. 8 in. from the front axle. The bogie side frames are built up by welding plates, channels and pressings, and the box has a nominal width of 4½ in. and a varying depth up to a maximum of 10 in. A swing bolster of similar

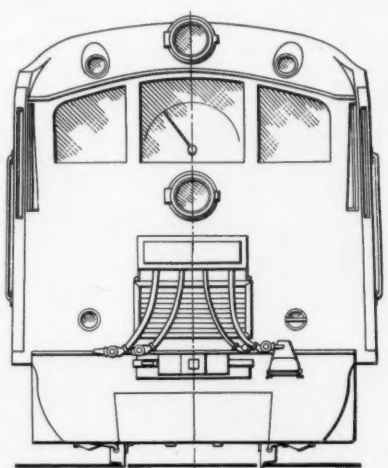




SECTION A A

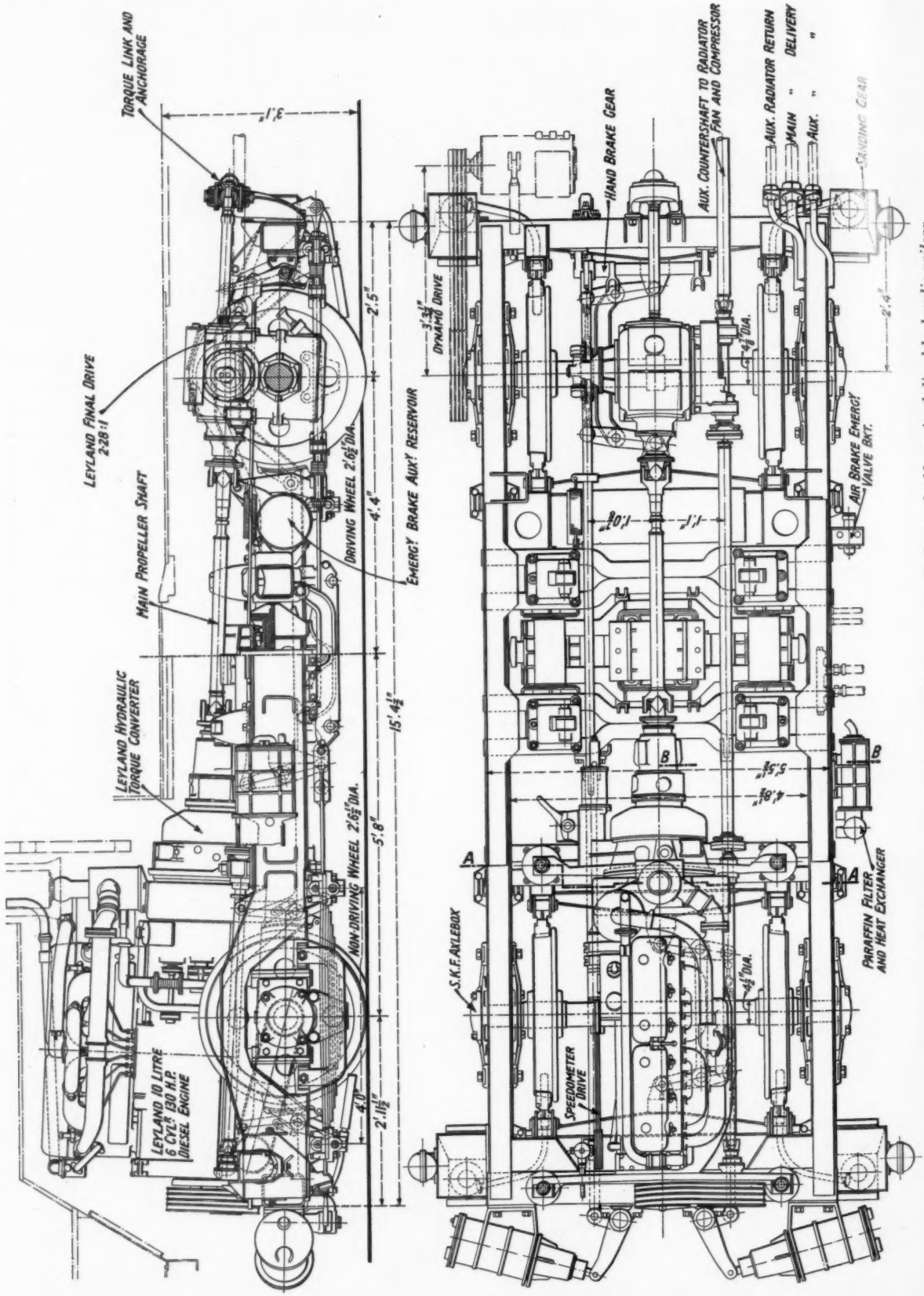


SECTION B B

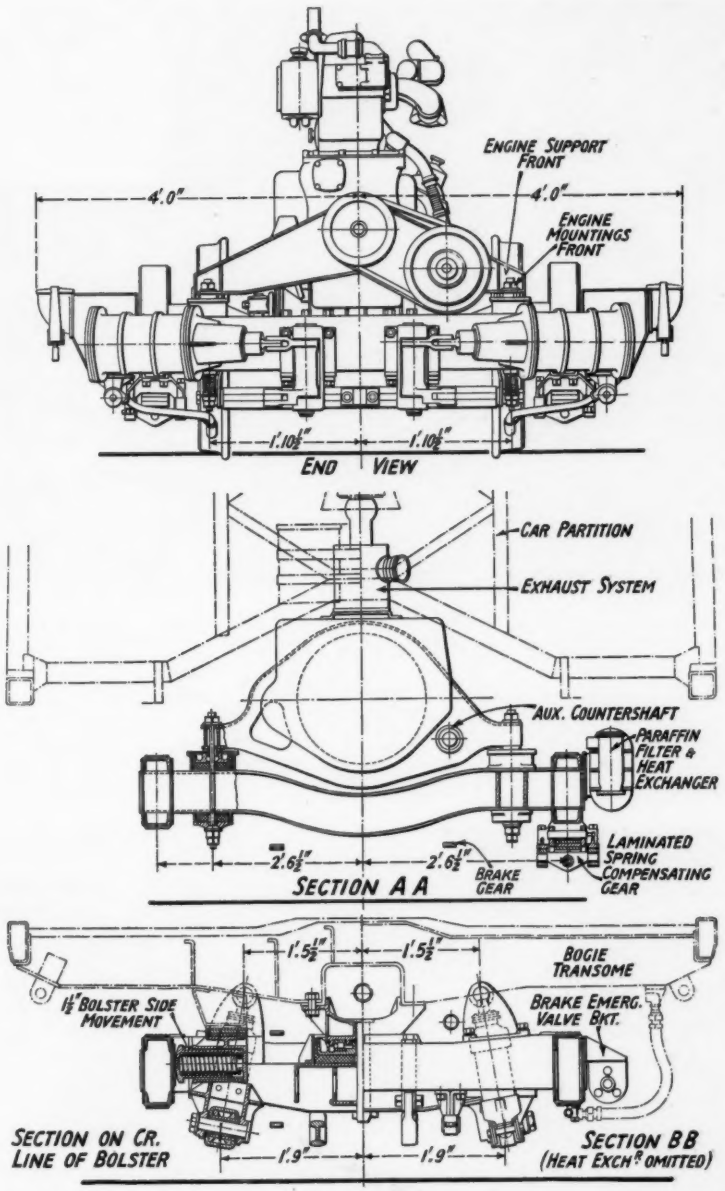


The body framing and bogie frames are of electrically-welded steel construction. In two of the cars the seating in the small saloon is of a somewhat more luxurious character, and there are only 12 seats in place of the 16 in the small saloons of the other four cars, as shown on this drawing

GENERAL ARRANGEMENT OF NEW ZEALAND DIESEL-HYDRAULIC RAILCARS



Elevation and plan of power bogie of New Zealand Government Railways double-engined diesel-hydraulic railcar



Cross sections at various points of the diesel-hydraulic power bogie fitted to the double-engined railcars of the New Zealand Government Railways. Note the large bell-housings carrying the Leyland 120-b.h.p. engine and converter unit at front and back and supported by four large rubber blocks. The bogie pivot is of the Timken taper roller type with rubber cushioning blocks. In the top view can be seen the belt drive for the radiator fan and air compressor shaft, and also the horizontal Westinghouse brake cylinders, which are mounted on the outer transom

construction is used, and is suspended on Clecko hydraulic shock absorbers. Helical side control springs also are provided to damp out lateral shocks. Immediately below the centre of the box side frames are the S.K.F. self-aligning roller bearing axleboxes which are supported by 10-plate underhung laminated springs with a 4-ft. span. The side faces of the axleboxes have a manganese steel liner and the hornblocks have Ferodo rubbing faces.

Westinghouse brake apparatus is fitted and applies two blocks on each wheel. The two cylinders for each bogie are mounted horizontally at an angle on the outer end transom, to which are also secured two short vertical brake shafts. The rigging is so arranged that in the event of a failure of any part, the whole brake system on that bogie would not be put out of action, the left cylinder (looking forward to the car end) applying the blocks on the two outer wheels and the right hand cylinder the blocks on the inner wheel. The handbrake has a short horizontal brake shaft supported by the rear transom, and actuates only the blocks on the driving wheels of each bogie. There are two 15 in. by 60 in. main reservoirs slung below the car floor. The wheels are of the tyred disc type 2 ft. 6½ in. diameter on tread.

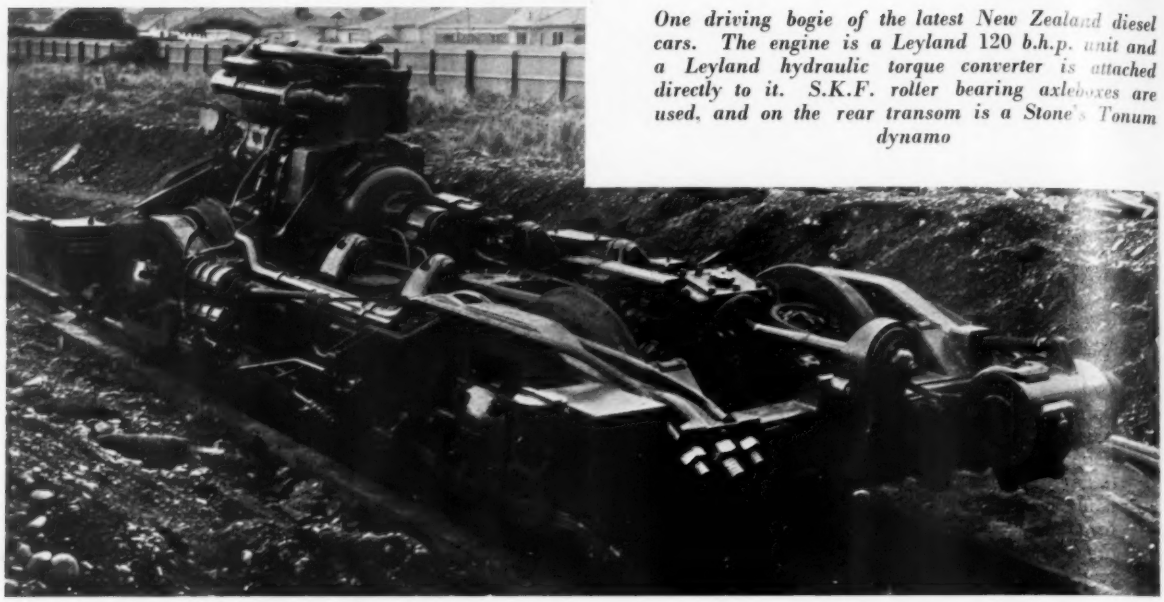
All steel welded construction has been used in the fabrication of the body framing, which is in one with the underframing. Pressings have been used to a great extent, particularly for the longitudinals, side posts and diagonals, and for the cross structures above the bogie pivots; for the transverse and diagonal members below the floor level it is mainly angles that are used. The outer panels and roof plates are of 18 s.w.g. steel and are sprayed over the inside surfaces with asbestos for sound insulation. The hoop sticks are of U or deep channel sections and there is an air gap of 7⅛ in. between the roof and ⅛-in. plywood ceiling.

Interior Details

The interior finish of the walls and ceiling of the body is of plywood sheathing covered in Rexine. The colour scheme is green for the wall sides and silver finish over

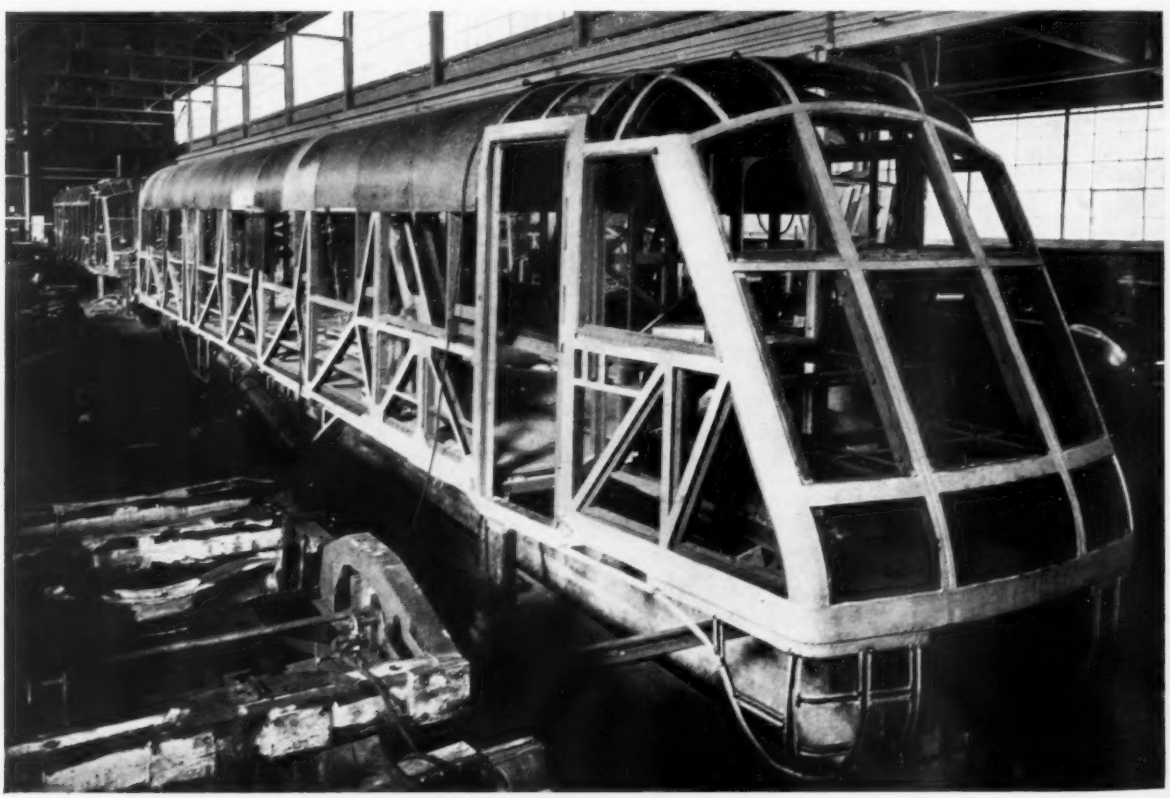
Elevation and plan of power bogie of New Zealand Government Railways double-engined diesel-hydraulic railcar

XUM



One driving bogie of the latest New Zealand diesel cars. The engine is a Leyland 120 b.h.p. unit and a Leyland hydraulic torque converter is attached directly to it. S.K.F. roller bearing axleboxes are used, and on the rear transom is a Stone's Tonum dynamo

the ceiling. The floor, which is of wood, is sprayed underneath with asbestos and covered on the top surface with $\frac{1}{8}$ in. rubber flooring of mottled green shade. The joints between the Rexine and rubber and other details are finished off with chromium-plated mouldings. Chromium-plated net-racks are provided along the sides of the car above the windows, which are of Rawlings' manufacture. The seats are of tubular frame construction and are reversible; the cushions are upholstered with Dunlopillo and the backs with Hairlok, the coverings being in brown leather. The car body is divided into two compartments, one larger than the other. In the first four cars all the seats are of the same type and there is seating capacity for 36 passengers in the large compartment and 16 in the small. For the two last cars special seating accommodation is provided. In the small compart-



Welded steel body framing of double bogie railcar under construction at Hutt Valley shops. Note the rigid diagonal framing of channel-shaped sections

ment the seats are of an adjustable reclining type and of a more elaborate nature to provide greater comfort. With this arrangement there is accommodation for 12 passengers in the small compartment, but the other compartment has the type of seating just described and the same capacity of 36 passengers.

Stone's 24-volt electrical equipment is embodied, and on one of the bogies is a Tonum dynamo, belt driven from an axle pulley on the outside of the axlebox. The electric lamps in the passenger saloons have rectangular opal shades set in chromium-plated frames. On each end of the car are two 10 in. Tonum head lights, the top one with a concentrated beam and the lower with a diffused beam, and three small marker lamps. The lamp resistance, switchbox and two-section 12-cell battery are housed beneath the car floor. Ventilation of the passenger saloons is assisted by nine Nuvac ventilators in the roof. Both the passenger and driving compartments are heated under thermostatic control by means of the Clayton-Dewandre heating system, comprising small heaters fitted under certain of the seats, these containing a heating element connected to the water circulation system of the engine radiators, over which element the air is forced by means of small electric fans, the warmed air being diffused throughout the passenger compartment.

A tip-up driver's seat is provided over the corner of each engine double casing, and the remainder of the space above the casing is used for luggage. The driving controls are the same at each end of the car and those for the torque converter and reversing gear are of the electro-pneumatic pattern. Other controls and fittings include those for the pneumatic sanding gear, pneumatic horn, window wiper, speedometer (driven from the carrying axle), engine starting switches, and lighting switches.

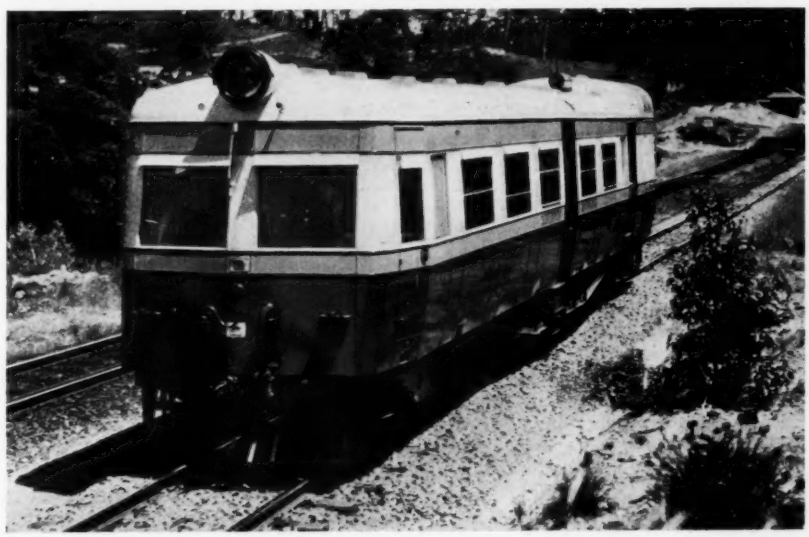
WEST AUSTRALIAN RAILCARS

Six vehicles in service on long 3 ft. 6 in. gauge branch lines

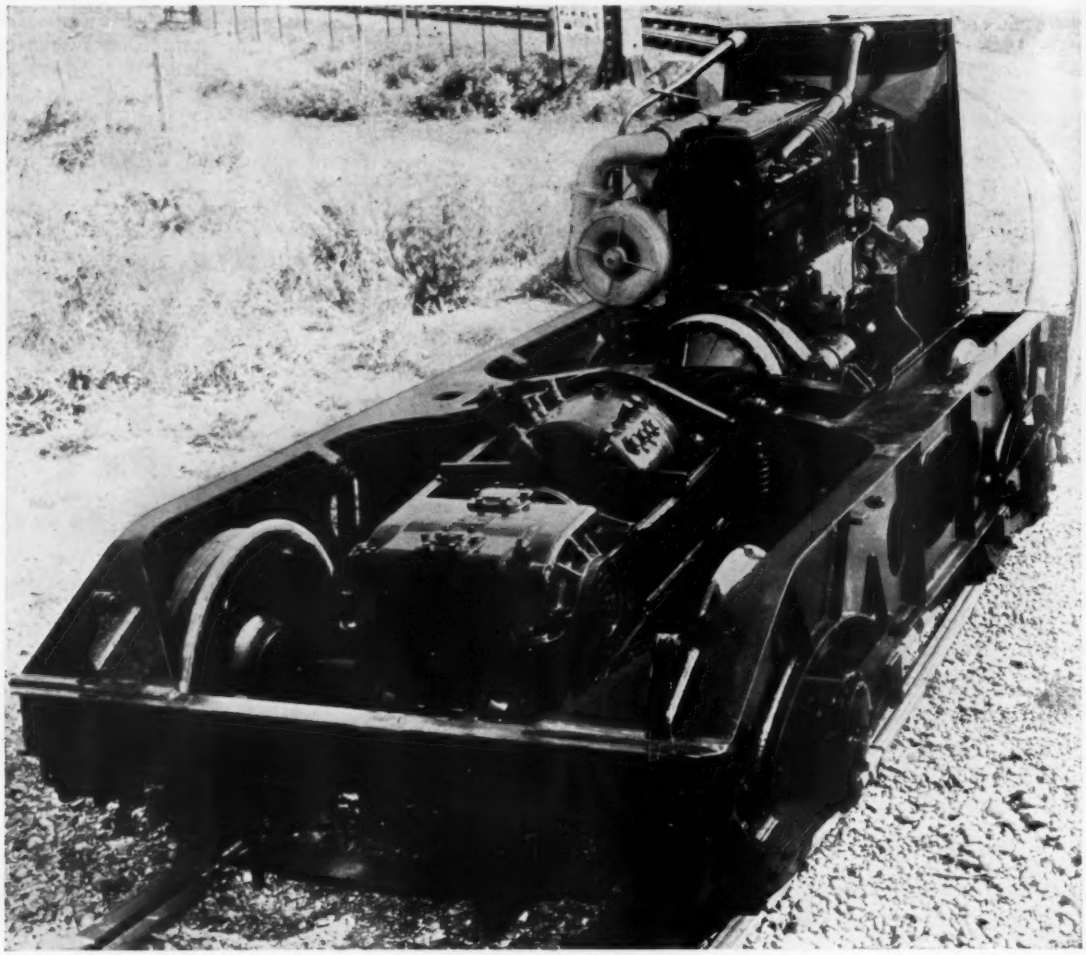
EARLY in 1937 Armstrong-Whitworth shipped one complete diesel-electric railcar and five sets of chassis and power equipments to the Western Australian Government Railways. (See issue of this Supplement for April 16, 1937). The bodies of the last five cars were built at the railway works in Perth, and the cars are now in service on accelerated schedules, and have a cruising speed of 40 to 45 m.p.h.

Four of the cars are stationed at Perth and radiate through the agricultural areas, three terminating at Merredin (169 miles from Perth by direct route) after traversing three separate agricultural lines, and one running south on the Great Southern Railway to Katanning (225 miles from Perth). The fifth car is stationed at Bunbury, a large outer seaport, and the principal port for the timber areas, and runs through the fruit-growing and timber areas to Bridgetown, Pemberton and Northcliffe, a distance of 132 miles; the sixth is at Geraldton, the seaport for the Murchison goldfields, and runs daily to Mullewa (67 miles) and twice weekly to Yuna (46 miles). In the Australian-built cars, the saloon is divided by an entrance vestibule into smoking and non-smoking compartments, and seats 40 passengers, and a small compartment is provided for the accommodation of the guard, luggage and parcels.

As the cars operate on lines where station platforms do not exist, folding steps are provided at the passenger entrance, and give easy access. These steps are of a new type specially designed for railcars; they are controlled by the driver and the operating mechanism is interlocked so that the steps cannot be lowered until the brakes are fully applied, and the brakes cannot be released until the steps are raised. The seats are fixed back to back, are well sprung and widely spaced to give comfort on long journeys. Parcel racks run the full length of the saloon on both sides and a clear space 10 in. deep is provided between seats and floor to accommodate ordinary suitcases. Two lavatories are provided at the ends of the saloon. In hot weather iced drinking water is available at both ends of the car. Water for the wash basins is raised by means of compressed air from a tank carried in the underframe.



One of the six 140-b.h.p. diesel-electric railcars of the Western Australian Government Railways. The motive power unit is a 140-b.h.p. Armstrong-Saurer engine and direct coupled generator mounted transversely near one end of the car



STEAM RAILCAR CONVERTED TO DIESEL

By Dipl. Ing. J. L. KOFFMANN

IN operation over the standard-gauge Peruvian Central Railway, particularly over the main line section from Callao to Oroya, which has 75 miles uphill continuously at 1 in 25-22 and rises to a height of 15,800 ft. above sea level, steam railcars have not been too successful, owing to the limited power output leading to boiler troubles. It was therefore decided to convert one of the cars to the diesel type. For this purpose D. Wickham & Co. Ltd., of Ware has designed and constructed to the requirements of Messrs. Livesey & Henderson, the consulting engineers to the Peruvian Corporation, a power bogie complete with engine and transmission. The car rebuilt as a diesel will have a length of 46 ft. 2 in. and a width of 9 ft., and will accommodate 40 second class and 20 first class passengers; the estimated weight is 24 tons when fully loaded.

The bogie has solid disc wheels of 2 ft. 6 in. diameter spread over a base of 8 ft. The side frames and the central cross stretcher are of 0·375-in. plates reinforced by 3·5-in. by 0·375-in. bracing plates top and bottom. A 7-in. by 3·5-in. by 0·375-in. steel angle is used as the front cross member and a steel channel of similar dimensions for the rear transom; the engine is mounted on three points on a subframe fabricated of 7-in. by 3-in. by 0·375-in. channels, and Silentbloc bushings are used at each of the suspension points. The bogie frame has been welded throughout, and particular care was taken to prevent additional stresses in the material through welding at highly-stressed parts such as joints and corners.

In order to reduce maintenance charges through the frequent renewal of hornblock or axle box side faces, a novel type of axlebox guide has been adopted. A pair of coned wheels running along straight track have an oscillation from side to side, the amplitude of which follows a sine curve and is equal to:

$$A = \tan y \sqrt{\frac{R \times d}{2 \times i}}$$

in which R is the wheel radius, d the distance between the rolling circles of the wheels, i the incline of the tread, and y the angle between the axle and the transverse axis of the bogie resulting from the horizontal play between the horn cheeks and the axlebox. As R, d, and i are more or less decided by the gauge and by the general constructional standards of the railway concerned, the amplitude of the oscillation can be affected only by reducing or eliminating altogether, the angle y. With this object in view, the axles in the new Wickham bogie have been

positively attached to the bogie frame by means of radius bars welded to the axlebox and which keep the axles parallel.

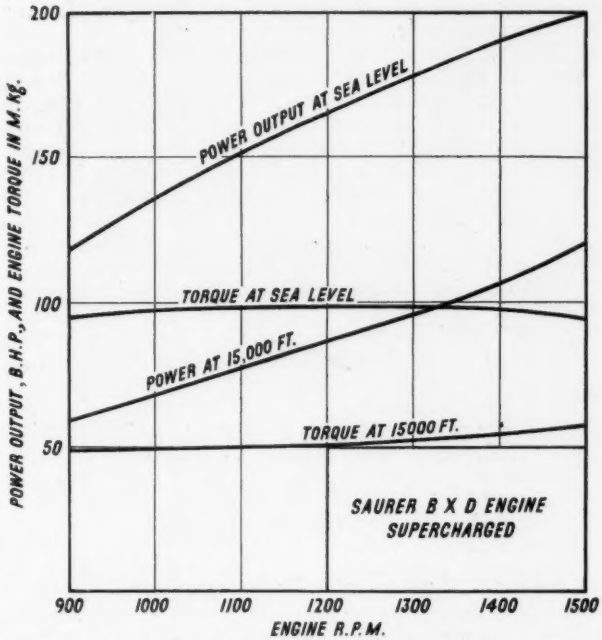
The axleboxes themselves are fitted with S.K.F. self-aligning roller bearings and are supported by underhung laminated springs acting through bronze bearings shaped so as to reduce the deflection with increasing load. The springs are composed of six plates 3 in. wide and 42 in. long, two of which are full-length back plates; the deflection is 0·707 in. per ton. The car body is supported at both sides of the bogie by helical springs with a deflection of 0·1875 in. per ton; each spring supports a plate carrying a pin which extends through the top plate of the bogie, and which holds the car body on an anchor-shaped bracket. The central pin going through the bolster deals only with the forces arising from acceleration and deceleration, and is fitted with rubber pads to check transverse movements of the car body. Brake blocks are applied on both sides of all wheels of a bogie by an 8-in. Knorr air cylinder slung beneath the railcar body; the rigging itself has been designed specifically to provide simplicity, easy adjustment, and a reduction in lost movement.

Power Equipment

Motive power is furnished by a Saurer BXD six-cylinder oil engine fitted with a Büchi VTx201 exhaust-gas turbo-charger. The cylinder bore and stroke are 130 mm. by 180 mm. (5·1 in. by 7·1 in.) and the normal unsupercharged output is 150 b.h.p. at 1,500 r.p.m. from a piston-swept volume of 14·33 litres and with a compression ratio of 15·2 to 1. The firing order is 1—4—2—6—3—5. The actual engine installed has a flat-bottomed sump with a large oil container clear of the bogie axle, for, as the wheelbase was limited by certain sharp curves, the engine had to be placed over the front axle.

As the power of any internal combustion engine decreases with the height above sea level at the rate of over 3 per cent. per 1,000 ft., the power output of an ordinary Saurer BXD engine would be reduced by about 45 per cent. at a height of 15,000 ft., and it was to ensure a reasonable output at such a high altitude that the engine for this rebuilt railcar has been equipped with a Büchi supercharger. The charging pressure is about 4 lb. per sq. in. (18 lb. absolute) as against a suction side pressure of 13·9 lb. absolute. The volume of indrawn air at 1,500 r.p.m. is about 440 cu. ft. a minute. The average blower speed is 20,000 r.p.m. and the maximum 26,000 r.p.m.; the maximum permissible exhaust gas temperature before the turbine is 550° C. An air filter is fitted to the induction pipe, and the supercharger is cooled by water by-passed from the engine cooling system.

Tests have shown that the normal power output of the engine at 1,500 r.p.m. at sea level can be increased to 203 b.h.p., an increase of 35 per cent., and that at 5,000 and 15,000 ft. the available power is 155 b.h.p. and 120 b.h.p. respectively. The fuel consumption at full-speed full-load at sea level has been reduced from the



Power and torque characteristics of supercharged engine within the height limits of the Peruvian Central Railway

173 gr. per b.h.p.hr. with the normal engine to 159 gr. per b.h.p.hr. when supercharged. A 60-hr. test showed an average output of 201 b.h.p. at 1,500 r.p.m. with a m.e.p. of 120 lb. per sq. in. and a fuel consumption of 162 gr. per b.h.p.hr.; the lubricating oil consumption was 1 gr. per b.h.p.hr. and the pressure 55 lb. per sq. in. The average temperature of the oil was 82° C. and that of the cooling water 80° C. The accompanying table shows data obtained from tests at various power outputs and speeds.

Transmission and Auxiliaries

On the bogie with the engine are mounted a Vulcan-Sinclair fluid coupling (mounted on a special adaptor plate bolted to the engine flywheel) and a four-speed Cotal electro-magnetic epicyclic gearbox which has ratios of 4·219, 2·597, 1·626, and 1·0 to 1. Between the fluid coupling and the gearbox is a cardan shaft 15 in. long which passes through the bogie centre transom. The gear controls are operated on a 12-volt circuit, and those in the driving position are interlocked so as to prevent a gear change upwards unless the engine is throttled down, but gearchanging downwards can be effected with the engine running at full speed. This feature results from the incorporation of a spring-controlled lock inserted between the throttle control and gear controller shafts, thus preventing

SAURER SUPERCHARGED ENGINE TEST FIGURES

Speed R.p.m.	Output B.H.P.	Fuel consumption Gr. per B.H.P.-hr.	Temperature of exterior air Deg. C.	Water temperature Inlet Deg. C.	Water temperature Outlet Deg. C.	Exhaust temperature Deg. C.	Temperature of lubricating oil Deg. C.	Oil pressure Lb. per sq. in.
1,500	203	158	12	72	80	510	81	56
1,500	181	160	11	72	80	480	84	56
1,400	174	158	11·5	72	80	480	84·5	56
1,200	152	159	11·5	73	80	485	81	50
1,000	120	161	11·5	71	80	460	80	45

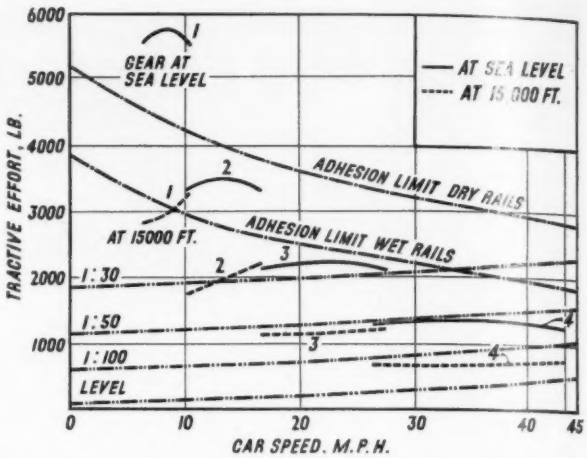
overloads of the gearbox with resultant slippage of clutches and increased wear.

The reverse gears are incorporated in the double-reduction axle drive and were manufactured by David Brown & Sons Ltd., of Huddersfield. The reversal is effected by means of Wickham's standard 5-in. diaphragm-type air cylinders. A locking device is fitted to the reversing rod in order to hold it in neutral should the car have to be towed. The centre-line of the final shaft of the drive is 10 in. above the axle centre, and the total reduction in the box is 2·97 to 1. The reversing valve in the driving position can be operated only by the use of two hands, in order to eliminate the possibility of changing the direction while the car is in motion. The throttle handle has a dead-man device embodied. The Cotal gearbox is connected to the reversing and axle drive through a Standage resilient coupling, and is supported by two 0·625-in. plates attached at the rear to the axle-drive casing and at the front to the bogie centre transom through brackets carrying swing links fitted with springs to cushion the torque reaction.

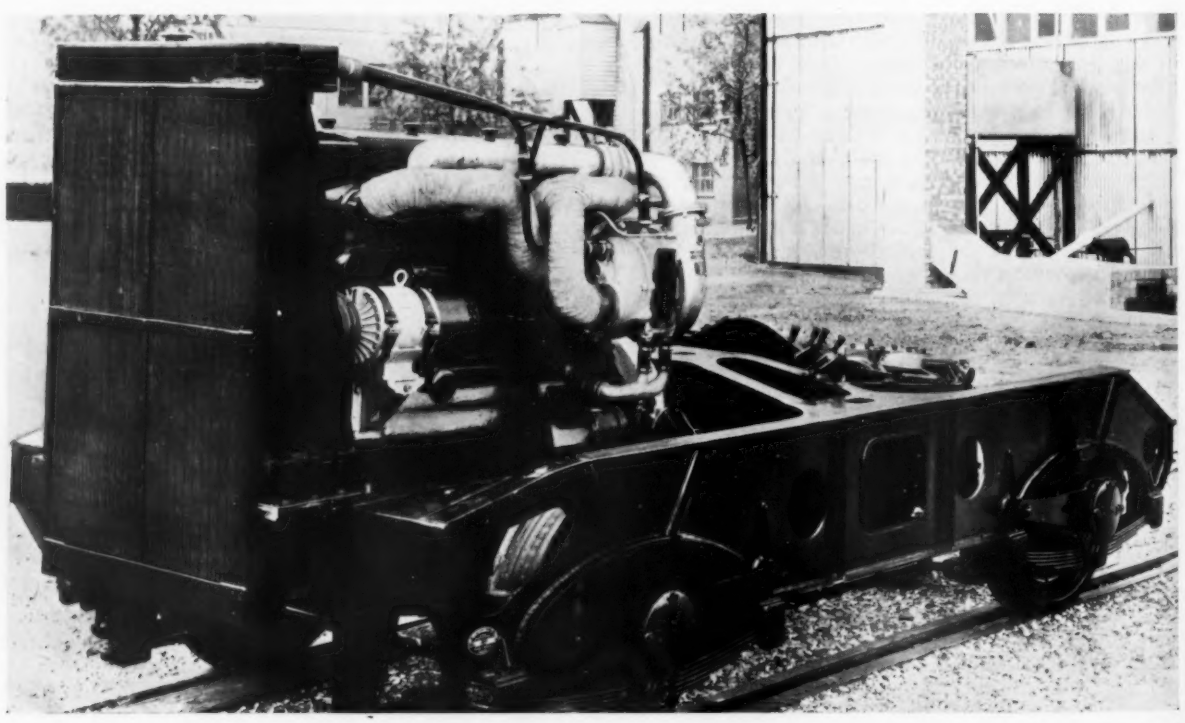
Compressed air for the brakes, reversing gear, and sanding is supplied by a two-cylinder compressor driven by the engine in tandem with the fuel pump; it has a capacity of 4·5 cu. ft. a minute at a pressure of 70 lb. per sq. in. Current for engine starting and gear operation is provided by the car's original axle-driven generator and a small battery supplemented by an engine-driven 1 kW. 24-volt dynamo and an additional 24-volt 300 amp.hr. battery.

Performance

The two sets of performance curves accompanying this article have been plotted on the assumptions that the overall transmission efficiency is 80 per cent. and that the fluid coupling has a slip of 3·5 per cent. On a straight level track the maximum allowable speed of 43·5 m.p.h. (70 km.p.h.) can be attained both at sea level and at a height of 15,000 ft., but at the latter height the rate of acceleration is reduced to about one-half. At sea level a grade of 1 in 30 can be negotiated at a top speed of 28 m.p.h. when using third gear, but at 15,000 ft. the top speed on such a grade is only 16 m.p.h. and second gear must be used. In common with many recent railcars having only one driving axle, the tractive effort developed in first gear and under certain circumstances with second gear also, is higher than that dictated by the adhesion limit, according to the state of the rails, and thus full engine torque cannot be used for acceleration at low speeds, even when sanding gear is used.



Capacity of Peruvian Central rebuilt railcar on the four gear steps and on various grades located at heights up to 15,000 ft. above the sea



Supercharged engine with transmission and auxiliary equipment on Wickham welded steel bogie

A New Locomotive Oil Engine

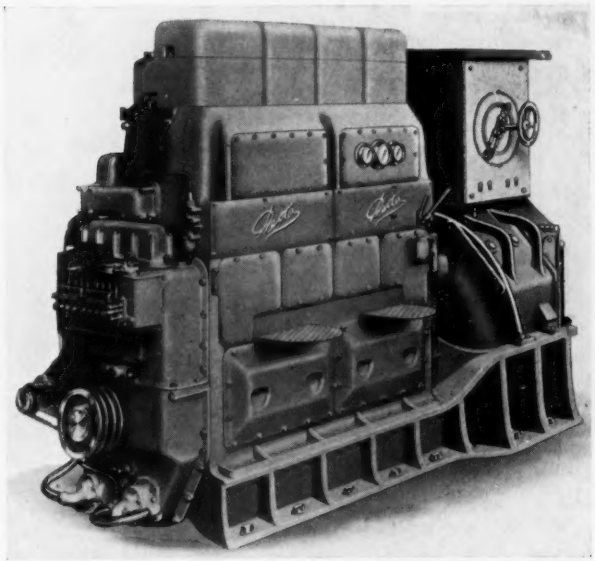
AN addition to the not very extensive range of railway two-stroke engines has been made with the introduction of a variety of models up to a maximum of 525 b.h.p. by Petters Limited, of Yeovil, which are suited to locomotive installations, their characteristics not fitting them for railcar applications. These engines are developed from the normal Petter range of 2, 3, 4, 5, and 6-cylinder engines running at 500 r.p.m., but the maximum revolutions have been increased, giving an increased output per cylinder. Aluminium pistons have been fitted, and external radiator cooling provided. Being intended more or less for constant speed operation, they are suited particularly to work in conjunction with electrical transmission, and the illustration of the four-cylinder engine accompanying this article shows a complete unit consisting of engine, generator, and electrical control apparatus. The unit cylinder size is 8½ in. by 13 in. and at 675 r.p.m. the maximum output is 87½ b.h.p. per cylinder, giving a brake m.e.p. of 70 lb. per sq. in. and a piston speed of 1,465 ft. per min., values which are quite up to the normal for two-stroke engines.

As with other railway two-stroke engines, a uni-directional scavenging system has been adopted. The scavenging air is supplied by a gear-driven Zoller-type positive-displacement eccentric-vane blower which has a displacement volume of 1·1 times the piston-swept volume of the engine, and it enters the cylinder through specially shaped ports designed to ensure efficient scavenging and to give a certain amount of controlled turbulence to promote good combustion. The exhaust passes through two large-diameter valves in the cylinder head; these valves are operated through push rods and rockers leading from a gear-driven camshaft in the upper portion of the crankcase. An adequate advance opening of the exhaust valves enables much of the exhaust gas to escape before the scavenging ports are opened, and efficient scavenging is obtained with the very moderate pressure of 1½ lb. per sq. in.

Fuel and Lubricating Systems

Fuel injection is by C.A.V.-Bosch unit-type pumps driven from the camshaft, and forcing the fuel through a centrally-placed C.A.V.-Bosch atomiser in the cylinder head. The underside of the cylinder head is flat and the combustion chamber is formed by dishing the piston crown. The gudgeon pin has been eliminated by using a spherical small-end bearing in which the pressure is taken directly through a Y-alloy insert to the ball end of the connecting rod. With this arrangement the piston is of a symmetrical design and has little tendency to distort, and the underside of the piston crown can be cooled very effectively by the circulation of lubricating oil. Four pressure and two scraper rings are carried by each piston. The big-end bearings are of whitemetal on a bronze backing and the main bearings are of whitemetal supported by a steel shell.

Forced lubrication with a dry sump is provided. The used oil collected by the scavenge pump is delivered to an external storage and settling tank, passing first through an oil cooler. The second, or pressure, pump delivers oil to all the bearings; from the main bearings the oil is forced through passages drilled in the single-piece balanced crankshaft to the big-end bearings. Thence the oil is led up to the small end by a pipe attached to the connecting rod and after circulating over the underside of the piston is led back down the connecting rods by a second pipe, from which it drains to the sump. The



Petter four-cylinder engine weighing 28 lb. per b.h.p., mounted on common underbed with electric generator and controller

importance of first class lubrication has been further recognised by the incorporation, as a standard feature, of a Stream Line filter, and by means of tapping from the lubrication system a proportion of the oil is continually led to this fitting for reconditioning. Both oil pumps are driven from the forward end of the crankshaft by means of a duplex roller chain provided with an adjustable jockey. The cooling water pump is also driven from the forward engine of the crankshaft, but through a laminated leather belt from a vee-grooved pulley.

Trade Publications

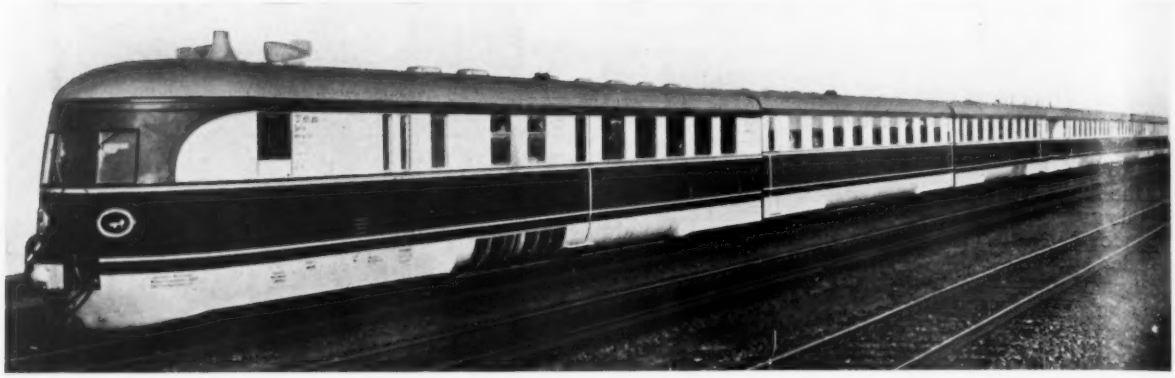
Armoured Plate Battery.—Twenty-nine different opinions on the new C.A.V.-Bosch armoured plate lead-type battery (see issue of this Supplement for December 24, 1937) are quoted in a 12-page publication issued by C.A.V.-Bosch Limited, of Acton.

Wilson Gearbox.—From the Self-Changing Gear Trading Co. Ltd., Perivale, Middlesex, we have received a well laid-out brochure on the Wilson preselective epicyclic gearbox, which, in addition to illustrating half-a-dozen types of rail tractors equipped with that gearbox, contains a sectional drawing of a four-speed unit. Also to hand from the same company is a series of reprints from this Supplement dealing with applications of the Wilson box to diesel locomotives and railcars, and one from *Gas and Oil Power* describing the Leyland horizontal-engined bus for the L.P.T.B.

Diesel Locomotives.—Diesel engines with an aggregate output of over 40,000 b.h.p. have been built during the past 15 years for locomotives and railcars by the Deutsche Werke Kiel, and those engines used for locomotive work have a full load fuel consumption of 170 to 180 gr. (0·374 to 0·396 lb.) per b.h.p. hr. One of the 265-b.h.p. engines was tested officially by the Automobile Club of France, and gave a very good performance. The construction and characteristics of D.W.K. diesel locomotives from 110 to 360 b.h.p. and for speeds up to 60 km.p.h. (37·3 m.p.h.) are illustrated and described in a six-page folder, No. 173.

FIFTEEN NEW DIESEL FLYERS IN GERMANY

Fourteen steel-framed diesel-electric and one aluminium alloy diesel-hydraulic trains put into main line service



Two of the new 100 m.p.h. three-car diesel-electric trains of the Reichsbahn coupled in multiple-unit. Büchi-supercharged Maybach engines with an aggregate output of 1,200 b.h.p. are used

THE need for further super-speed long-distance inter-urban services in Germany has not unnaturally led to the construction of further diesel-electric streamlined trains, and a total of 14 triple-car sets is being put into service at the moment. As each component of these trains has already been well-tried out in service, the new sets form virtually a repeat order, although they mark a further progressive stage in the development of diesel trains for long-distance service on the Reichsbahn.

The original Flying Hamburger had 102 second class seats in open saloons on a tare weight of 74½ *tonnes*, and had a buffet service; the two bogie-mounted Maybach engines had an aggregate output of 820 b.h.p. The succeeding 13 two-car trains have more roomy second class accommodation, also in open saloons, and have a buffet counter and a slightly more elaborate meal service; they have 77 seats on a tare weight of 87 *tonnes*, are articulated like the original unit, and are powered by two Maybach 410-b.h.p. engines. After these came the first triple-car trains—two with electric transmission and two with Voith hydraulic drive; two classes of accommodation are provided against one in the two-car trains, and the 109 third class and 30 second class seats are arranged in compartments; a buffet is included in the formation and the tare weight of the hydraulic-drive sets is 115 *tonnes* and of the electric-transmission trains 125 *tonnes*; two Maybach engines with Büchi superchargers provide a total output of 1,200 b.h.p.

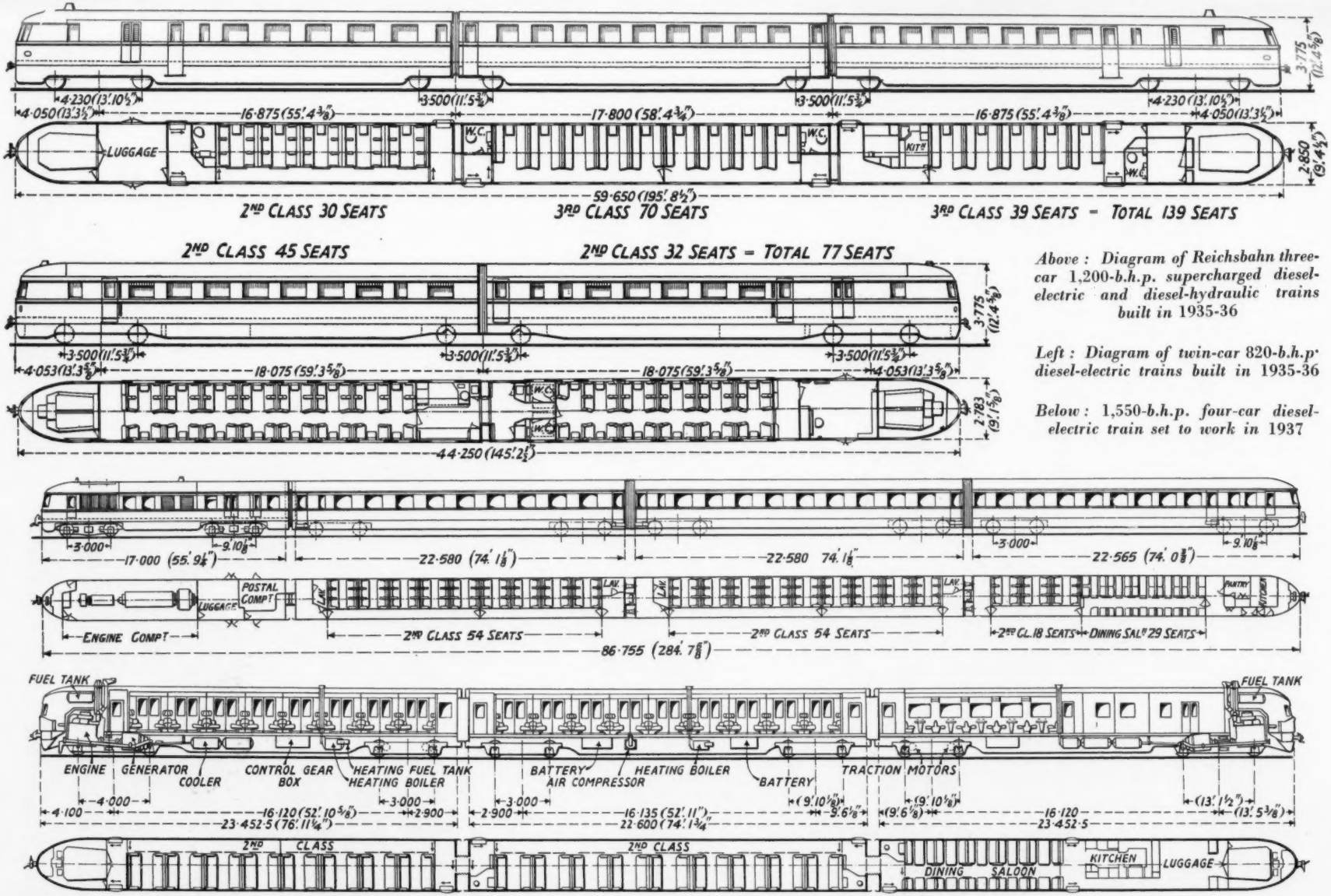
Next in point of time came an experiment in the shape of a four-car non-articulated train in which the leading vehicle is short and houses only the single engine and the mail and luggage rooms; instead of two bogie-mounted Maybach engines one M.A.N. Büchi-supercharged 1,400-b.h.p. engine is installed, and its output supplemented by a 150-b.h.p. M.A.N. engine for the auxiliaries; the accommodation is second class only, arranged in compartments, and there are 126 seats plus 29 in a separate dining saloon. Finally, there are the 14 triple-car non-articulated trains now being delivered, which have 102 second class seats in 17 compartments, a 30-seater dining saloon, and a luggage compartment with a floor area of 120 sq. ft.; power is provided by two 600-b.h.p. Büchi-supercharged Maybach engines mounted on the end bogies.

In addition, there is a new 100-seater triple-car aluminium 1,200-b.h.p. diesel-hydraulic train known as the *Flying Silver Fish*, which embodies ideas of the inventor Kruckenberg. This train was built by Westwaggon and has Maybach engines and Voith transmission. It tares 125 *tonnes* and on test between Berlin and Cologne has attained a speed of 195 km.p.h. (121·2 m.p.h.). The earlier types of *schnelltriebwagen* were described in the January 24, 1936, issue of this Supplement, and the M.A.N.-engined four-car set in the February 18, 1938, issue.

Latest Triple-Unit Sets

The 14 new three-car trains, built by the Linke-Hoffmann Werke, have the engines on the outer bogies, and two electric traction motors on the inner bogie of each end car; the centre vehicle is a trailer, but carries an air compressor, the batteries, and its own heating boiler. All the wheels are 930 mm. (36·6 in.) in diameter, but the engine-carrying bogies have a wheelbase of 4·0 m. (13 ft. 1½ in.) whereas the driving bogies and those of the centre car have a wheelbase of 3·0 m. (9 ft. 10 in.). The tare weight of the train is approximately 161 *tonnes*, and empty but with supplies about 166 *tonnes*. The framework of the cars is of welded steel sections with 1·5 mm. steel side panels and 2·5 mm. steel end plates. The seats are comfortably shaped and upholstered and the compartments finished in pear wood and maple. The dining saloon seats are upholstered in leather. Mitropa runs the dining car service.

Heating of the cars is on a hot-water system with an oil-fired thermostatically-controlled hot-water boiler located beneath the floor of each coach, and with an exhaust duct leading up to the roof between the wainscoting of two adjacent compartments. The hot water is circulated through the heaters in the compartments by an electrically-driven pump. Ventilation is assisted by Kuckuck air extractors in the roof of each compartment, and the windows can be opened right down by cranked handles



Above : Diagram of Reichsbahn three-car 1,200-b.h.p. supercharged diesel-electric and diesel-hydraulic trains built in 1935-36

Left : Diagram of twin-car 820-b.h.p. diesel-electric trains built in 1935-36

Below : 1,550-b.h.p. four-car diesel-electric train set to work in 1937

Diagram of one of the 14 new 1,200-b.h.p. supercharged diesel-electric trains of the Reichsbahn with compartment and full dining accommodation

GERMAN STATE RAILWAY HIGH-SPEED DIESEL TRAINS

No. off	Year put into service	Type of train	Transmission	Aggregate b.h.p.	Engine make	Tare weight, tonnes	Gross weight, tonnes	Length, ft.	No. of sets	Type of accommodation
1	1933	2-car artic.[1] ..	Electric ..	820	Maybach	75	85	137·5	102[2]	Saloon; buffet.
13	1935–36	2-car artic. ..	Electric ..	820	Maybach	87	98	145·2	80[3]	Saloon; buffet.
2	1935–36	3-car artic. ..	Electric ..	1,200	Maybach[5]	125	140	195·7	139	Compartment; buffet.
2	1935–36	3-car artic. ..	Hydraulic	1,200	Maybach[5]	115	130	195·7	139	Compartment; buffet.
1	1937	4-car non-artic.	Electric	1,550[4]	M.A.N.[5] ..	188	207	284·6	155[6]	Compartment; diner.
14	1938	3-car non-artic.	Electric ..	1,200	Maybach[5]	161	176	228	132[7]	Compartment; diner.
1	1938	3-car artic. ..	Hydraulic	1,200	Maybach[5]	125	136	228	100	?

[1] Original Flying Hamburger. [2] Including four seats in buffet. [3] Including three seats in buffet. [4] Only one main engine.
[5] Büchi supercharger fitted to engines. [6] Including 29 seats in diner. [7] Including 30 seats in diner.

adjacent to each window seat. A small hinged table is arranged below each window. Electric lighting is provided by the two auxiliary generators, or by two 56-cell 110-volt batteries when the engines are not running.

Braking is on the Hildebrand-Knorr compressed air system with electric control. There are two large cast-iron brake blocks applied to the rims of all wheels, and this is a difference compared with the previous two-car and three-car trains, which had drum brakes. Braking forces up to 200 per cent. of the tare weight can be applied at speeds from 60 km.p.h. (37·3 m.p.h.) up to the nominal service maximum of 160 km.p.h. (100 m.p.h.); below 60 km.p.h. the braking force is regulated by a centrifugal-type retardation controller so that the braking force does not exceed 80 per cent. of the tare weight. For emergency use electro-magnetic railbrakes are fitted, and there is also an inductive type of automatic train control apparatus. The axles are carried in roller bearings, and Scharfenberg automatic centre couplers are used for the mechanical, pneumatic and electric connections.

Motive Power

On the outer bogies are carried the engines and main generators, but only the engines and their exhaust and induction systems project above the floor level, and the engine is beneath a double-walled casing of metal plates and Xylotekt insulating material. The engine is of the normal Maybach 12-cylinder vee type but fitted with a Büchi exhaust-gas turbo supercharger in order to give a normal output of 600 b.h.p. at 1,400 r.p.m. The weight of the engine complete with supercharger is 2,400 kg. (5,300 lb.), equivalent to 4 kg. (8·85 lb.) per b.h.p.; the piston-swept volume is 48·25 litres, giving a power output of 12·4 b.h.p. per litre at the full-load speed. The cylinders are 160 mm. by 200 mm. (6·3 in. by 7·9 in.) and the fuel is injected directly by Deckel Compur pumps. The crankcase is a single-piece silumin casting brought up to the level of the cylinder heads; the heads and liners are of cast iron and are cast integrally. In each engine is a 1,250-litre (275-gal.) fuel tank.

Each main generator feeds the two traction motors on the same car, and the multiple-unit electric control embodied is on the Reichsbahn's standard RZM system, which by the incorporation of a supplementary field control automatically keeps the engine speed within close limits of the predetermined values. The main generator has a self-exciting shunt winding, a separately-excited shunt winding, and a series winding excited by the auxiliary generator. This last winding serves as an opposed-field winding when the set is running, and is also used as a starting winding for the main generator when the latter is motoring the engine. The electrical equipment of the trains was supplied by the Siemens-Schückertwerke and the A.E.G.

Interior of second class compartment in new German three-car diesel-electric trains, showing inner protective glass

MORE AMERICAN DIESELS.—The Southern Railway System of the U.S.A., operating in the Texas, Alabama and New Orleans area, is proposing to purchase six twin-car diesel-electric passenger trains. The Seaboard Air Line has ordered nine 1,800 b.h.p. Winton-engined trains from the Electro-Motive Corporation.

AMERICAN DIESEL TOTAL.—At the end of 1937 the number of diesel locomotives in traffic on railways in the U.S.A. was 389, of which 360 were for shunting or short-distance freight traffic. These figures do not include streamlined trains with a power car instead of a locomotive. At the end of March last there were 40 diesel locomotives on order.

EAST INDIES PROSPECTS.—In the June 11, 1937, issue of this Supplement we drew attention to the consideration then being given to the adoption of diesel railcars by the Netherlands East India State Railways. In the Report on Commercial and Economic Conditions in the Netherlands East Indies just issued by the Department of Overseas Trade is a paragraph reading "Sale prospects in new diesel or electric railway traction units should be closely watched. A technical mission to Siam reported favourably on diesel traction and air-conditioning in October, 1937, and funds are available."

NOTES AND NEWS

New Zealand Diesel Enquiry.—The New Zealand Public Works Department is calling for tenders for nine diesel locomotives for use in mines. The approximate weight is 4 tons and the engine must have an output of at least 20 b.h.p.

Roumanian Shunters.—The 25 four-wheeled diesel-mechanical shunting locomotives ordered by the Roumanian State Railways are to be powered by Ganz-Jendrassik oil engines, and not as stated on p. 277 of our August 5 issue.

Patent Precombustion Chamber.—The Daimler Benz A.G., of Stuttgart, has patented (No. 487,204) in this country a new form of precombustion chamber for oil engines, which is claimed to effect a fuel economy in small high-speed engines. The precombustion chamber contains a central projection surrounded by a ring of holes, and has a specially-shaped throat.

Tasmanian Railcars.—Experiments with railcars have been made over a number of years by the Tasmanian Government Railways, and the latest diesel cars have given every satisfaction. The use of diesel cars is to be extended, first on the Hobart suburban sections, where trailers will be hauled by new cars incorporating Gardner-engined Drewry power bogies having Vulcan-Sinclair fluid couplings and Wilson epicyclic gearboxes.

Indian Railcar Proposals.—The Indian Railway Board's rolling stock programme for 1939-40 contains a special provision of Rs. 11 lakhs for the purchase of 10 railcars for the Madras & Southern Mahratta Railway. These cars are intended for use on sections severely affected by road competition. Diesel-electric railcars (see issues of this Supplement for January 25 and February 22, 1935) have already proved very successful in combating road competition on the M. & S.M. lines.

Union Pacific Streamliners.—The first 11-car *City of Los Angeles* diesel-electric train of the Union-Pacific Railroad (see issue of this Supplement for July 10, 1936) is being given a further observation-lounge car and a further locomotive unit in view of increasing patronage. The formation of the new train is now: two diesel locomotive units; an auxiliary-equipment, baggage, and dormitory car; a 40-seater chair car; a 48-seater chair car; a 32-seater diner-kitchen car; a 60-seater diner; a 22-seater 11-section Pullman car *Hawaii*; a Pullman, *Mormon Trail*, with accommodation for 18 passengers in 7 bedrooms and 2 compartments; a similar car, *Lanai*; a Pullman coach, *Honolulu*, and another, *Oahu*, each with accommodation for 22 passengers in 11 sections; and the new observation car, *Copper King*, which has Polaroid variable-light-density windows. The Union Pacific Railroad's stud of diesel streamliners is now as given in the table at the foot of this page. All have Winton two-stroke engines.

Paris-Strasbourg Service.—The fast service introduced with the summer timetables between Paris and Strasbourg has, owing to delayed delivery of the triple-car Bugatti trains, been worked by the triple-car diesel-electric trains of the ex-Nord system. The run of 502 km. (312 miles) is covered in 4 hr. 25 min. including a 4 min. stop at Nancy, equivalent to a speed of 114 km.p.h. (70·5 m.p.h.). The trains operating this service are stationed at the Nord depot at La Chapelle and run from there to the Gare de l'Est via the Petite Ceinture line.

Nord Diesel Train Services.—The ten ex-Nord three-car diesel-electric trains (nine with two Maybach 410 b.h.p. engines and one with two Maybach Büchi-supercharged 600 b.h.p. engines) now operate over 4,000 km. (2,500 miles) a day, comprising four return trips between Paris, Lille, and Tourcoing; one return trip between Paris, Liége, and Maastricht (going through three countries); and one return trip between Paris and Strasbourg. On any given day seven trains are in service, two are being held in reserve, and one is normally counted as being under repair.

L.M.S.R. Diesel Order.—As announced exclusively in THE RAILWAY GAZETTE for August 12, the L.M.S.R. is to acquire 20 further 50-ton diesel-electric shunting locomotives. The mechanical portions are to be built at Derby works, and an order has been placed with the English Electric Co. Ltd. for 20 complete sets of engine, transmission, and control equipment. The engines will be of the English Electric six-cylinder 350-400 b.h.p. type running at 685 r.p.m., as used so successfully in 11 of the existing diesel-electric shunters of the L.M.S.R. The general layout of the locomotives will be similar to the 10 Armstrong-Whitworth 400 b.h.p. locomotives, and will incorporate a single traction motor driving the wheels through a geared jackshaft and rods.

American Diesel Train Mileages.—The Union Pacific Railroad's two City of Denver diesel-electric streamliners completed two years of service on June 20 last. In the two years the aggregate mileage was 1,530,000, equivalent to 383,000 miles per annum per train. On June 21, an aggregate mileage of 5,000,000 by the fleet of Burlington Zephyr trains was completed. The two Chicago-Denver trains, introduced in November, 1936, have 1,512,549 miles to their credit; the original three-car Zephyr, completed in November, 1934, has built up a mileage of 547,700 miles. The eight Zephyr trains now in service (see issue of this Supplement for May 13 last) have carried a total of over 1,260,000 passengers. The Rebel diesel trains of the Gulf, Mobile & Northern Railway completed 1,000,000 miles on June 10. The first two trains were put into service in the summer of 1935, and a third train was introduced early this year.

UNION PACIFIC RAILROAD STREAMLINED TRAINS

Date placed in service	Number	Name	Aggregate b.h.p.*	Total number of cars, including power cars	Type of train	Tare weight, English tons	Overall length, ft.	Passenger capacity
January, 1934 ..	M-10000	*City of Salina*	600	Three	Distillate-electric	100	204	112
September, 1934 ..	M-10001	*City of Portland*	1,420 (1,200)**	Seven†	Diesel-electric	245	455	118‡
May, 1936	M-10002	*City of Los Angeles I* ..	2,320 (2,100)§	Thirteen††	do.	‡‡	‡‡	261‡‡
Summer, 1936 ..	M-10003	Spare unit	2,620 (2,400)	Two power cars	do.	—	—	—
June, 1936	M-10004	*City of San Francisco I* ..	2,620 (2,400)	Eleven	do.	446½	725	220
June, 1936	M-10005	*City of Denver I*	2,580 (2,400)	Twelve	do.	568	884	272
June, 1936	M-10006	*City of Denver II* ..	2,580 (2,400)	Twelve	do.	568	884	272
December, 1937 ..	M-10007	*City of Los Angeles II* ..	6,300 (5,400)	Seventeen	do.	1,100	1,267	245‡
January, 1938 ..	M-10008	*City of San Francisco II* ..	6,300 (5,400)	Seventeen	do.	1,118	1,292	222‡

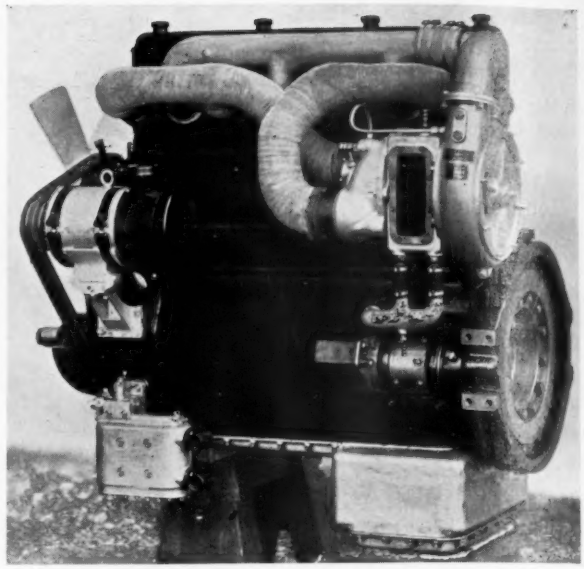
* Including auxiliary engines; traction power in brackets.
† Originally six cars.
‡ Including sleeping and dining accommodation.
** Originally 900 b.h.p. § Original power.
†† Originally 11 cars.
‡‡ Originally 424 tons, 714 ft., and 220 passengers.

A Supercharged Railcar Engine

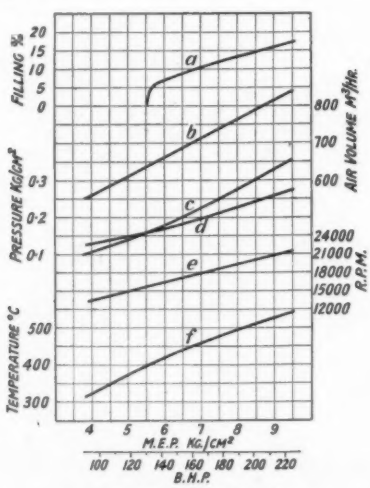
NUMEROUS experiments and extended trials have been made with the well-known Saurer BD engines to which a Büchi exhaust gas supercharger was fitted, and the combination is now being offered commercially. It has been installed in the Wickham power bogie for the rebuilt railcar of the Peruvian Corporation, and further sets are being delivered for railcars in France and Sweden. It will be recalled that the unsupercharged BXD engine has six 130 mm. by 180 mm. cylinders and gives a maximum output of 180 b.h.p. at 1,500 r.p.m. on a weight of about 2,600 lb.

The Büchi supercharger, fed by the exhaust gases, is mounted at one end of the engine, and has a turbine rotor of 190 mm. (7½ in.) diameter and a blower of 200 mm. (7⅞ in.) diameter. The turbine and fan casings are built up of light metal, and the supercharging unit has a weight of only 42 kg. (93 lb.). The operation of the unit is governed automatically by the load on the engine. There are two groups of turbine nozzles, one fed by the exhaust of cylinders 1 to 3 and the other by that of cylinders 4 to 6. The normal speed of operation is 24,000 to 24,700 r.p.m., and the top speed, with the maximum exhaust temperature of 600° C., about 26,000 r.p.m. Owing to the light weight, the supercharger group has been mounted on one of the side inspection covers, and the alterations to this, the exhaust manifold, and to the valve timing and camshaft, and a reduction in the compression ratio from 15 to about 14¼ to 1, are all the modifications required to the standard model.

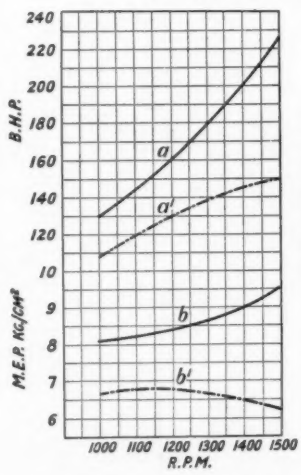
Features of the Büchi supercharging system are an induced pressure drop in the exhaust piping and an appreciable period during which both the inlet and exhaust valves are open, promoting an adequate flow of air which cools the pistons, valves, and combustion chamber walls, and keeps the temperature of the exhaust at a value low enough to prevent any deleterious action on the turbine blades. The heat lost to the cooling water is no greater than in the corresponding unsupercharged engine. To study the air flow and fuel-mixing in the BXD combustion chamber, a wooden model of the cylinder head, with two inlet and two exhaust valves, was made. The cylinder liner was represented by a glass container in which moved a model piston.



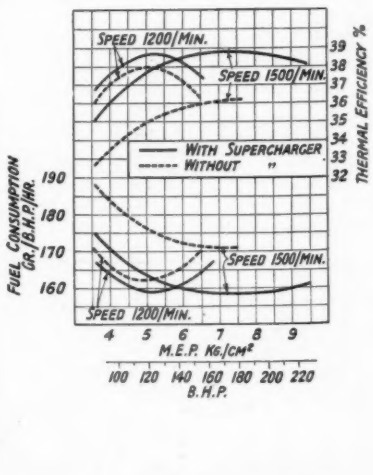
Accompanying figures show the performance of the supercharging apparatus and of the engine with and without supercharging. The maximum output as limited by the appearance of smoke in the exhaust, at an exhaust temperature of about 550° C., is 225 b.h.p. at 1,500 r.p.m., the m.e.p. at this output being 9·4 kg. per sq. cm. (134 lb. per sq. in.), the supercharger speed 22,000 r.p.m., and the blower pressure 0·35 kg. per sq. cm. (5 lb. per sq. in.). It will be seen that with the supercharged engine the m.e.p. continues to rise with increasing speed up to the top value of 1,500 r.p.m., whereas in the unsupercharged engine, the m.e.p., as is customary in such engines, begins to fall from the speed of maximum torque. The fuel consumption of the supercharged engine is the lower over the whole speed and power range, and at 225 b.h.p. at 1,500 r.p.m. is 161 gr. per b.h.p.hr. With an output of 180 b.h.p. at 1,500 r.p.m., the point of lowest fuel consumption in both engines, the specific value of the unsupercharged unit is 171 gr. per b.h.p.hr., and of the supercharged engine 158 gr. per b.h.p.hr., representing a gain of 7½ per cent. in favour of the latter, and giving a brake thermal efficiency of 38·8 per cent.



a—Proportion of scavenging air
b—Delivery capacity of blower
c—Blower pressure
d—Exhaust pressure at turbine
e—Supercharger speed
f—Exhaust gas temperature, deg. C.



a—Output, supercharged engine
a'—Output, normal engine
b—m.e.p. supercharged engine
b'—m.e.p. normal engine
Values limited by smoke



Fuel consumption and thermal efficiency of supercharged Saurer engine at fixed engine speeds and varying outputs